May 2, 1984 Vol. 18, No. 18A On Communications

Olympian X Al Oerter IOn Datacom

Special Section

Pather Online

T. Ord States and Co

Paging

WIRSTOGUIVYMUIVYM FCWB NIVERSITY MICROFILMS EFIAL PUBLICATIONS 00'N ZEEB RO NN APBDR MI 48106

MAKE THE CONNECTION...SIMPLER

THE POPCOM X-100

THE OUTMODED MODEM



- Plug the modem into a power source.
- 2. Turn on the computer.
- 3. Plug the modem into the computer.
- Plug the telephone line into the modem.
- 5. Plug the phone into the modem.

NOTE: THE POPCOM MODEL X-100

ONLY COSTS \$475.



- Plug the transformer into a power source.
- Plug the transformer into the modem.
- 3. Switch on the modem.
- 4. Determine whether your computer is a DTE or DCE. (Check the manual if in doubt.)
- Carefully open the case of your modem.

CAUTION: MAKE SURE THE POWER IS OFF BEFORE OPENING THE CASE.

- Set the eight binary switches (consult your manual for details).
- 7. Carefully close the case.
- Plug the telephone line into the modem.
- Plug the modem into the computer.
- 10. Turn on the computer.

NOTE: IF YOU WANT TO SIMULATE VOICE DATA SWITCHING GO BUY ANOTHER ADAPTOR.

It used to be you and your computer. Now it can be you, your computer, and the world. And as you can see, our POP-COM X-100 modem makes getting started a lot simpler.

Communication is simpler too, because we let you switch back and forth between voice and data on the same line. That way, you don't have to hang up and re-dial just to find out if somebody got what you sent.

Our POPCOM X-100 automatically adapts to the interface cable on your computer, which means you don't have to know what kind of RS-232 interface you have. And our X-100 transmits at the fast, economical 1200 bps rate as well as the standard 300 bps.

The POPCOM X-100 uses the most popular software communications packages available today.

We built all these features into our X-100 for one reason: We think a modem should simplify communication, not complicate it.

For more information, go to your local dealer, or contact PRENTICE Corporation P.O. Box 3544 Sunnyvale, CA 94088 408/734-9855.

DPRENTICE

Corporation

POFCOM X100

POPCOM is a trademark of PRENTICE Corp.

The Light Brigade

By Kevin Murphy
No longer is there even a thread of a
doubt about the future of this
trendy transmission technology.



Please Pass The PBX

By Patti Hartigan
Sharing is taking on a new dimension in communications with the rise of multitenant shared systems.



Protocol Conversion

By Tony Katz
The proliferation of personal computers has pushed protocol conversion into the limelight.

Florida Regulation

By Bruce Renard
Now that Congress and the FCC
have muddled the regulatory waters, the states take over.

R&D

By Stafford Hopwood Look for the "D" side of R&D to weigh heavily in the post-divestiture environment.



Special Section: The Olympics

Go for the Gold

By Bruce Hoard
Olympics discus champion or veteran data communications network designer? Al Oenter has thrown himself into both worlds.



Temporary **Telephones**

By Katherine Hafner
AT&T's temporary telephone system spans the width and breadth of the Olympics.



Message Moving

By Katherine Hafner Electronic mail for the masses? Here's a truly Olympic system.



By Bruce Hoard
In the event you ever want to tie together over 4,500 square miles of
Summer Olympics competition.



Mux Ado About Multiplexers

By Lee Sudan
The multiplexer metamorphosis is making its way into a multitude of networks.



Paging Progress
By Helen Peterson
Forget about beepers. Paging is the up-to-date term for describing this rapidly maturing technology.

Front-End **Processors**

By D.R. McCormick
IBM still stands astride the frontend processor marketplace it created 12 years ago with the trusty 3705.

Electronic Funds Transfer

By John Vacca
You can bank on the fact that EFT
networks are moving legal tender
faster than ever before.







DEPARTMENT

Editorial _ Dialogue _ Pro & Con _ At Large 11 Washington, D.C. 12

Remember When

Remember the good old days of AT&T?

Sure you do. You remember what it was like when Ma Bell was always there with a helping hand, when all you had to do was make that one quick telephone call to get all the answers to your telecommunications problems.

You remember what it was like before you had to enlarge your waiting room to facilitate all the new companies selling equipment and services. And, of course, you remember what it was like when you didn't have to understand all that new equipment and all those new services.

But then you thought AT&T was an evil, un-American thing: a monopoly.

Think back some more. You remember what it was like when isolating faults in your network was quick and easy. For starters, you knew who was responsible: The Phone Company, The Bell System, AT&T. Not Baby Bell, Attis or some other weird name. And you could count on getting those glitches cleaned up pronto most of the time without calling around to find out which company was in charge and then waking up some marketing rep in the middle of the night for service.

But AT&T was so arrogant, it wanted everything its own way. It was too big for its britches

Now remember some more.

Remember when paying your corporate telephone bill was almost as easy as paying your home telephone bill? OK, AT&T, thank you very much, it is a pleasure working with you, love those leased lines. Things are a little different now you say? You say you have so many %!@?&! telephone bills, you don't know where to start paying? What? You don't even know if you're getting everything you've paid for?

Remember when you did?

Well... AT&T, they uh, they charged too much.

Yes, of course. But remember when you didn't have to dial 120 digits to make a long-distance call, when you didn't get tons of junk mail at home describing the latest, least expensive way to beat Ma Bell? Come to think of it, Ma Bell was almost like a real person, wasn't she?

Think back.

Back to the days when all your future networking plans weren't put on the shelf until somebody named Judge Greene made up his mind. Back to the days when terms like "modem" and "multiplexer" were more important than legalese like "injunction" and "appeal"?

But the government is only looking out for users

Sure, and it's doing a good job and all, especially the politicians that work so hard for us, but remember when telecommunications was a one-step process, when there were no tough decisions to make and everything just took care of itself? Those were the good old days.

Remember?



CW COMMUNICATIONS/INC. Box 880, 375 Cochituate Road Framingham, Mass. 01701

Board Chairman/Publisher Patrick J. McGovern

President W. Walter Boyd Senior Vice President Lee Vidmer Group VP-Communication

Services Tack Edmonston

Group VP-Circulation Margaret Phelan
VP-Sales Donald E. Fagan
VP-Finance William P. Murphy VP-Editorial John Whitmars

Special Focus

Publications Administrator Jenny Charlesworth

Editor Bruce Hoard Managing Editor Pattl Hartigan Senior Writer Katherine Hafner

Art Director Tom Monahan Graphic Designer Dianne Gronberg Art Assistant Marina Bonacci Production Director Peter Holm Production Manager Marlene Stibal Production Assistant Stephen DeLacy

Pasteup Manager Patricia Gaudette Typesetting Manager Carol Polack Advertising Traffic, Special Publications Pam Valentinas

Second-class postage paid at Framingham, Mass., and additional mailing offices. Computer-soorld (ISSN-0010-4841) is published weekly, except: January (6 issues), Rebruary (6 issues), March (5 issues), April (7 issues), May (5 issues), June (7 issues), July (6 issues), August (6 issues), September (6 issues), October (7 issues), November (6 issues), December (6 issues) and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., 80x 880, 375 Cochituate Road, Framingham, Mass. 01701.

Convright 1984 by CW Communications/Inc. All rights re-

Copyright 1984 by CW Communications/Inc. All rights re-served. Reproduction of material appearing in Computer-world and On Communications is forbidden without written

uorid and On Communications is forbidden without written permission. Send all requests to Nancy Shannon.

Computerworld subscription prices: \$2.00 a copy; U.S. — \$44 a year; Canada, Central & S. America — \$110 a year; Burope — \$165 a year; all other countries — \$245 a year (airmail service). Computerworld On Communications single copy price: \$5,00. Four weeks notice is required for change of address. Please allow six weeks for new subscription service.

Computerworld can be purchased on 35mm microfilm through University Microfilm Int., Periodical Bury Dept., 300 Zebb Road, Ann Arbor, Mich. 48106. Phone: (313) 761-4700.

PHOTOCOPY RIGHTS: Permission to photocopy for inter-

PHOTOCOPY RIGHTS: Permission to photocopy for inter-nal or personal use or the internal or personal use of specific clients is granted by CW Communications for libraries and othclients is granted by CW Communications for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of \$3.00 per copy of the article, plus \$5.50 per page is pald directly to Copyright Clearance Center, 21 Congress Street, Salem, Mass. 01970.

Fermission to photocopy does not extend to contributed articles followed by this symbol. \$\frac{1}{2}\$ POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., Box 880, 375 Cochituate Road, Framingham, Mass. 01701.







Computerworld On Communications is a member of the CW Communications/Inc. group, the world's largest publisher of computer-related information. The group publishes 52 computer publications in 19 major countries. Nine million people read one or more of the group's publications each month. Members of the group include: Angentina's Computerworld, Australia's Australia Computerworld, Australia's Australia Computerworld, Australia's Australian PC World and Directories; Beazil's DataNews and MicroMundo; China's China Computerworld. Penmark's Computerworld. tories; tracui s Juanewus and microamand; Cinnia s Coma Computerworld; Denmark's Computerworld/Danmark and MicroVerden; Finland's Mikro; France's Le Monde Informati-que, Golden (Apple) and OPC (IBM); Germany's Computer-woche, Microcomputerwelt, PC Welt, Software Markt, CW Edition/Seminar, Computer Business and Commodore Mag-azine; Italy's Computerworld Italia; Japan's Computerworld Labous and Berco Com Weeld, Mexico: Computerworld (Mexico) azine; Italy's Computerworld Italia; Japan's Computerworld Japan and Perso Com World; Mexico's Computerworld/Mexico and Computhundo; Netherland's CW Beneiux and Micro/Info; Norway's Computerworld Norge and MikroData; Saudi Arabia's Saudi Computerworld; Singapore's The Asian Computerworld; Spain's Computerworld Espana and MicroStstemas; Sweden's Computerworld, Espana and MicroStstemas; Sweden's Computerworld, Hespana and Computer Business Europe; the U.S. Computerworld, Hot CoCo, In-Cider, InfoWorld, Jr., MacWorld, MICRO MARKETWORLD, Microcomputing, PC World, PC Jr. World, Run, 73 Magazine and 80-Micro.

For datacomm network monitoring and management,

there's only one...

AVANT-GARDE

For more information about Avant-Garde products, call Art Alberding at 609-778-7000.

Or write to:

AVANT-GARDE

8000 Commerce Parkway Mt. Laurel, New Jersey 08054

© 1984. Avant Garde Computing, Inc.
Net/Guard, Net/Link, Net/Measure, and Net/Switch are trademarks
of Avant Garde Computing, Inc. Net/Alert is a registered trademark.
Tempo is a trademark of DTSS Inc.

If you have 24 lines, like **St. Paul Insurance** Or 2000, like **Southern Bell Telephone...** There's only one Avant-Garde.

If you are an insurance company, like Metropolitan Life
A utility, like PSE&G
A bank, like Connecticut Bank and Trust
A retailer, like Best Products
A telephone company, like New York Telephone
An entertainment company, like Disney
A government organization, like the Library of Congress
Or a manufacturer, like BMW...
There's only one Avant-Garde.

If you want performance monitoring only, like Westinghouse and Home Insurance Or electronic matrix switching integrated with performance monitoring, like GTE, Equitable, and Shearson/American Express...

There's only one Avant-Garde.

From BMW in Munich to California State Automobile Association From CSST in Quebec City to Florida Power & Light in Miami. From Fidelity Systems in Boston to El Paso Natural Gas . . . There's only one Avant-Garde.

For Net/Alert, the performance monitoring and management system, field-proven and continually enhanced since 1979.

For Net/Switch, electronic matrix switching proven and integrated with Net/Alert for over a year.

For **Net**/*Guard*, the system to control and monitor PC access to networks.

For **Net**/*Link*, the network analysis and planning tool.

For Net/Measure, the performance monitoring system for up to 12 lines.

If you want the expertise and the proven technology to monitor individual applications or transactions, 56kb high-speed lines, and nearly 40 different protocols...

There's only one Avant-Garde.

If you want more than 30 software specialists who continually improve our products and develop new ones...

There's only one Avant-Garde.

If you want to save hundreds of thousands of dollars in network operations, improve services and manage growth, there's only one Avant-Garde...

The pioneer and leader in network monitoring and management.

How do you think AT&T is going to fare as a player in the computer market?

Jean Blodgett, vice-president, electronic communications, Valley National Bank, Phoenix:

"Competitively speaking, I think they are a little slow, but I think in the next two or three years they should do a turnaround and come back very strong. I do know that this is where their ma-

jor efforts are going.

"I have no doubt that, looking beyond communications, they are going to be a force getting into a lot of these areas. However, I still feel that they have a way to go in terms of gathering the customer's

or the user's faith. One reason for this is that divestiture has brought a lot of problems."

James Mayer, vice-president, communications and information management, Chemical Bank New York

"My expectation is that they are going to fare rather well. AT&T seems to take a long time to decide on its approach and what it wants to do, but once it commits itself, it usually has its act together. AT&T is going into the computer market full-blown, so I'm

sure it will be able to provide a significant amount of resources or whatever it takes to produce a reasonable product and market it.

"But AT&T has been working extensively in the past few years, working more professionally. Even with the confusion that is going on with divestiture, the AT&T marketing group seems to be much more professional than it was 10 years ago. I think AT&T's marketing approach and the people in its organization seem to be very professional. I think they entered the market with caution. I assume that this is a whole new area for AT&T, that it is going to take a lot of resources and commitment from the organization."

R.D. Stoutenburgh, telecommunications director, Sheraton Corp., New York.:

"It depends on how long it takes them to learn how to deal with a competitive market. My general feeling is that AT&T has always felt itself to be the best vendor with the most expensive equipment, and AT&T felt it was worth it. It may have the best [private branch exchange] equipment already, but you do not want to pay so much more for just a tiny difference. Now, if it takes that same approach in computers—and the ones we have seen are the high-end expensive ones—it will have a hard time making it in the business, because it is very competitive.

"Against a vendor like Digital Equipment Corp., I think its equipment will perform as well. Obviously, AT&T will have different products for different places and so forth. It will obviously have a bigger conceptual resource to apply, and so AT&T will be easier for people to buy from. Essentially, you can buy from someone besides IBM.

"So, AT&T is moving in as an established player without established equipment. If it can make its price and its product competitive, it will get a lot of business. If it follows as it has in the PBX area, AT&T is liable to lose out. Its PBXs, which are all AT&T has sold at this point, are more expen-

sive than the competition.
"I think the question is more fundamental than marketing. I hope AT&T has recognized it by selecting Olivetti and Convergent Technologies, [Inc.]. But it has had fundamental problems in applying its capabilities to deliverable equipment. It has not been able to understand what a customer wants. It has Bell Labs, which is great, and manufacturing, which makes great equipment, and it has salesmen who are good salesmen, but all three are doing different things. AT&T needs to be a small company that understands the market, understands what people want and can deliver it in less than 10 years."

Walter E. Ulrich, president, Walter E. Ulrich Consulting, Houston:

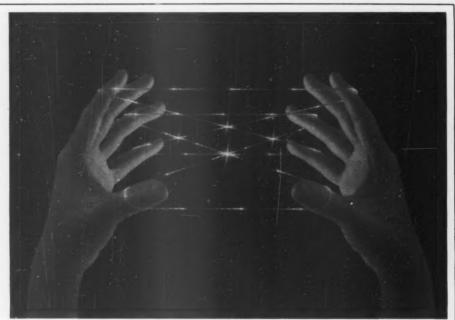
"My heart feels that there is a balance, some good and bad things for AT&T. It is my sentiment that AT&T has an excellent opportunity: The potential is there. If they execute well, I think they will fare well, but they have some problems to overcome."

Ed Horrell, president, Mitchell

& Horrell, Inc., Memphis, Tenn.:

"First of all, let me make some assumptions. Assuming that the thrust of AT&T's marketing is in microprocessors and miniprocessors, which are offered in conjunction with communications systems, I think AT&T will fare well

"I think if it tries to get into the stand-alone market, it will find it to be a different ball game out



Do you have a data communications network or does it have you?

Why tie up your resources when you can take advantage of ours? And there's never been more reason for taking advantage of RCA Cylix than right now during this period of deregulation and divestiture. Here's why.

Unlike the other guys, we don't just hand you a line. We deliver the stars. Because we're a satellite based, value-added network. Providing end-to-end management and a permanent virtual circuit that's perfect for transaction oriented applications.

What's more, you'll always get our undivided attention. Because data communications is all we do. And since you're working with just one company—not several—you'll never get lost in the shuffle.

RCA Cylix isn't just more convenient. It's also more efficient. Setting up your own network involves a huge commit-ment of time, personnel and capital funds. Our single vendor simplicity eliminates all that.

One phone call puts our experienced people to work for you. Setting up your

network. Handling all those dealings with all those phone companies. And then keeping your network running smoothly thanks to our unique service concept. Plus our design flexibility makes growth easy.

We can do all this more efficiently than you can due to our years of experience. And that can save you money. Because research indicates that personnel, benefits and associated overhead account for up to 1/3 of all networking costs.

Whether you're expanding an existing network or building a new one, now more than ever RCA Cylix is not only the easy choice. But the right one for data networking anywhere in the United States, Canada or Alaska. For more information

Cylix Communications Network

Not just a source but a resource.

and our free brochure, "Managing Your Network: Post-Divestiture Costs and Concerns" call our marketing department today at 901-683-3043. Or send in this coupon.

COMPANY		
0011111111		
ADDRESS		
CITY	STATE	ZIP
PHONE		
Protocols curre		
(including look		
□ IBM 3270	SDLC	
☐ Burroughs P		
CHAR CO.	ther	
U X.25 U OI		
	note locations	

there. In other words, if it continues to sell a complete concept that is, the movement of data and information, whether it be voice data or bits and bytes of data — I think it will find that it can migrate into more of a complementary product line than if it tries to go out and attack the more classical DP manufacturers on a standalone basis.

"In other words, I think that AT&T would be in for somewhat of a rude awakening in that particular area

"I think if AT&T sells the prod-uct as an enhancement or the flagship of its complete product line, it should be pretty strong.'

Generation Gap



I thoroughenjoyed your On Communications. It is so great, in an industry where the language is gen-erally undecipherable, to see the head-line: "Rolm line: wasn't bought in a day

This, among other things, brightened my day. My one criticism, and I guess this is always true when I deal with the younger generation, is that the picture on the cover had the receiver of the

telephone hanging upside-down. Perhaps it was by design, but I felt that it was simply such a foreign world to today's generation that they weren't certain what that phone originally looked like in its form of use.

> George Tice Geyer-McAllister Publications New York, N.Y.

Net Conclusion

I have just completed reading the "Special Section" on local-area networks in the March 14, 1984 issue of Computerworld On Communications. Your narrow perspective on the issues surrounding local-area network eval-

uation disappoints me.
I cannot believe — - after all this time of reporting the potential benefits of local nets and endorsing the merits of true processor interconnectivity — that vendors and the Computerworld staff are

On Communications welcomes letters from its readers. Letters should be typed, double-spaced and no longer than 150 words. They should be addressed to Editor, Computerworld On Communications, 375 Cochituate Road, Box 880. Framingham, Mass. 01701.

still grappling with which topol-ogy or which access scheme is better. When will you admit and address the fact that local-area network software must become the critical factor?

It is not enough to say that a particular networking scheme is the chosen or better performing one and then expect local-area networks to fulfill expectations. Without the provision of software services that meet the users needs, the question of access facilities is moot. Issues such as interprocessor mail transfer, file sharing (with proper format conversions between unlike processors) and distributed processing strike me as the topics that should be discussed, not collisions and bandwidth.

Until the perception of localarea networks as being market-driven instead of technology-driven is realized, productivity benefits through their use will continue to be elusive. For the sake of the industry, take a more realistic position on local-area networks

Mark R. Scherfling GTE Laboratories, Inc. Waltham, Mass.

CPE Shopping Spree

I thoroughly enjoyed your re-cent issue of Computerworld On Communications. It was excellent. I would, however, like to correct some omissions in the list of vendors and their product of-fering to the regional Bell operat-

ing companies.
In addition to basic telephones and speed-dialing sets, we sup-plied key telephone systems to some of the regional Bell operating companies, and we are sup-plying our System 3100 digital pri-vate branch exchange to Bell South.

Incidentally, ITT also won a Bell Atlantic contract, and we are supplying single-line telephone sets to Nynex.

Jeffrey T. Wood ITT Telecommunications Corp. Raleigh, N.C.



The Whisper Terminals, from 3M.

Three devices that plug in anywhere for instant TWX/Telex, electronic mail, and database communications.

Does your organization need portable and/or desktop ter-minals for TWX and Telex users?

Are your sales represen-tatives interested in a handy, tatives interested in a handy, time-saving way to submit orders and obtain information from headquarters while in the field?

And has your company

And has your company been seeking a cost-effective means of implementing electronic mail?

If your answer to even one of the questions above is "yes", then you should be looking at the Whisper Terminals from 3M.

An integrated family of multi-purpose terminals.

3M's Whisper Writer, Whisper Reader, and Whisper Screen are communications devices that serve users in four differ-

- ent ways:

 As TWX and Telex termi-
- For remote access to computer databases and infor-

- mation services, using their own built-in modems.

 As substitutes for (or supplements to) dedicated ASCII terminals.
- For message forwarding and retrieval via an elec-tronic mail network.

Whisper Writer: a fully trans-portable teleprinter.

Whisper Writer is about the whisper writer is about the size of a portable typewriter. It incorporates all of 3M's four Whisper Terminal functions and can be used in an office or on the road. Its built-in text-different performs about the size of the editing software, battery-maintained memory, and quiet 35-cps printer make it a versatile performer at a com-petitive price.

Whisper Reader: a terminal that weighs just 2 lbs.

This book-size unit does most of what Whisper Writer does, with the obvious exception of printing. Like Whisper Writer, it lets users prepare text offline to save on telephone.

TWX, and Telex charges

Whisper Screen: a smart ter-minal that communicates.

3M's intelligent CRT terminal has a standard RS-232C interface, plus a built-in modem for communications at 1200 or 0-300 baud. A 16K

at 1200 or 0-300 baud. A 16k memory with print spooler is standard, as are a variety of automatic dialing, log-on, poling, and answering leatures. Hard copy output for both the Whisper Screen and Whisper Reader is provided by 3M's complete line of low-cost, quiet Whisper Printers. Obviously, there isn't room here to describe the attributes of 3M's Whisper Terminals in detail. For the full story – and for a brochuer onther 3M products for the Orchestrated Office – call foll-free or mail the coupon toll-free or mail the coupon today.

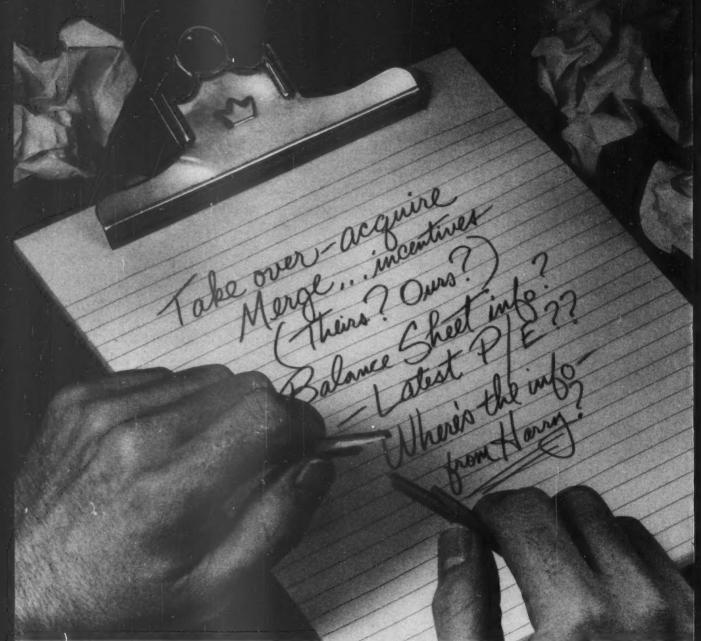
Call 800-328-1684 toll-free. (In Minnesota, 800-792-1072; in Canada, call 800-268-9696)

	OW 5-2
ucts Division Attn : G. Collin	Communication Prod- s luilding 216-2N 5144
Whisper Termi ucts for the Or	d information on 3M's nais and other prod- chestrated Office. rrange a demonstra-
Name	
Title	
Company	
Address	
City	
	Zip
State	ep_

3M hears you



No one ever said decision-making is easy.



But Telemail can make it faster.

You need information to make decisions And Telemail™ electronic mail can bring it to you in seconds. Faster than a phone call. Faster than overnight services. Faster than telex...

Over the GTE Telenet public data network. Use our Telemail service to exchange information on financing, personnel, pricing...inventory, delivery, forecasts the vital, timely facts you need to form good judgments.
 With Telemail and a terminal or a

PC, you can broadcast messages to your entire organization, or communicate one-onone. Messages can be stored, and delivered when and where you wish.

Telemail: It can turn snap judgments into informed decisions. Cost-effectively. In seconds.

For a free demonstration in your office, call, toll-free 1-800-835-3638.

Telenet

Lord of the Ring?

Back in the summer of 1982, the long-suffering IEEE 802 Committee on Local-Area Network Standards was hammering out a standard for the token passing ring topology. That is when IBM, Olof Soderblom and the Dutch-owned Willemijn Holding Co. came into the picture.

It was reported that IBM had paid "over \$5 million" to Wille-mijn in order to license the rights to a token passing patent Soder-blom had developed for a Swedish bank and subsequently passed on to Willemijn.

Unsurprisingly enough, the payment of money is at the heart of this situation. Willemijn's terms comprise a 24% across-the-board sales royalty based on the net selling price of each node, with a high-end maximum of \$275 per node in the token passing network.

There is also a \$25,000 down payment, but of that amount, \$10,000 is creditable against the 2%% sales royalties.

In this month's "Pro and Con," we take a look at the controversial patent and the furor over its future.



PRO

By George Vande Sande

In the fast-moving field of electronics and communications, it has taken 17 years for the market to recognize fully the inherent advantages of token passing rings. Recent developments, among them the imminent announcement of IBM's token ring localarea network, indicate that token rings will capture a dominant share of the local net market.

In 1967, the major Swedish bank, Svenska Handelsbanken, planned an on-line system to connect 2,000 terminals in 500 branch offices, spread over 1,500 miles, to a central computer site in Stockholm. The requirements were similar to those for present local nets.

During the design of the Swedish bank's system, Olof Soderblom, who was employed by the bank at that time, suggested the concept of unaddressed polling, now known as token passing, to improve performance and reduce hardware costs. The resultant token passing network is still the backbone of the Swedish bank's communications network.

IBM was contracted to implement the Swedish system, and

Vande Sande is a partner in the law offices of Pollack, Vande Sande & Priddy, Washington, D.C. He represents Willemijn Holding B.V. internationally.

subsequently embarked on internal token ring R&D projects at its labs in Europe and the U.S. Many articles on token ring technology were published, and IBM applied for many related patents beginning in the early '70s. Several IBM product lines announced in the mid- and late '70s use the original token ring concept, including the System 8100, the 3650 Store System, the 3650 Supermarket System and the 4700 Banking System.

Willemijn Houdstermaatschappij B.V. (Willemijn Holding B.V.) of Rotterdam, Netherlands, a company specializing in international licensing, now owns the worldwide rights to the Soderblom patents. Patents have been granted in 25 countries, in many cases after extensive prosecution. The prosecution of the U.S. patent involved two appeals and two interferences and took 13 years to complete. Despite a major effort by IBM, the patent was issued in 1981.

In the course of licensing negotiations, Willemijn has frequently encountered the argument that the Soderblom invention is limited to a system requiring a special master unit and that all data is required to be transmitted to the master unit. But the Soderblom invention is much broader than that; it was the first to incorporate decentralized control of data transmission over a loop or ring by circulating a token around the loop or ring and causing any of the nodes storing data to transmit only in response to the token as it reaches them in turn. The basic concept of the invention is not (Continued on Page 8)

CON

By William F. Zachmann

The socially beneficial encouragement of useful innovation is the motivating rationale behind patent laws. According to the usual argument, providing an inventor with a property right to his invention makes it worthwhile for him to invest time, money and effort in translating the invention into socially useful innovation.

But every stick, as the saying goes, has two ends. Patent protection can also have unfortunate consequences. Consider, for example, the possibility of a company whose product might be rendered obsolete and uncompetitive by an invention. In order to protect its product, the company might buy the rights to the invention and then simply file it away, unused. In this hypothetical example, competition and innovation are inhibited.

The whole philosophy of patent protection implicitly assumes that the invention requires some significant effort on the part of the inventor. The operative model is basically that of Thomas Alva Edison's phrase, "Genius is 1% inspiration and 99% perspiration." The notion of encouraging invention by providing a period of protection to the inventor makes sense

Zachmann is vice-president, corporate research, International Data Corp., Framingham, Mass.

for inventions that are the result of substantial research and experimentation.

I do not profess to be a legal expert on the casuistic nuance of patent law. However, it does not take a lawyer to see that if general notions — in which the inventor has little investment of time and effort other than in legal proceedings — are allowed the protection of patents, they are unlikely to serve any useful social purpose and may inhibit, rather than stimulate, progress.

The case of Olof Soderblom's patent and its relation to the to-ken ring local net scheme sponsored by IBM and under consideration for the IEEE 802.5 standard is complex. Although Soderblom and his attorney believe that Soderblom's patent applies to the token ring network scheme, it is not certain that this is the case.

Apparently legitimate questions have been raised concerning Soderblom's patent. First, there is a specific legal question as to whether his U.S. patent was appropriately granted in the first place. Some, at least, believe that patents of more or less the same scheme or at least portions of it had been granted in the past. So there is at least the possibility that when tested in court, Soderblom's patent might be rejected. It is difficult to be certain of the outcome of such possible court action.

There is also some question as to whether Soderblom's patent specifically applies to the IEEE 802.5 token ring network scheme anyway. Soderblom's patent, as originally granted, clearly and unambiguously refers to a fixed master station and multiple slave stations. In the IEEE 802.5 draft standard, however, there definitely is no master station, because all stations on the ring are effectively peers. Soderblom has advanced the position that whichever station holds the token is effectively a master station and, therefore, claimed that the patent applied. I am unqualified to judge the

I am unqualified to judge the legal niceties of this, but there is little question in my mind that this argument is casuistic, at best. Certainly, the simple meaning of words — not necessarily persuasive with lawyers and courts — would not allow Soderblom to reinterpret the language of the original patent in this way.

It is my understanding that Soderblom has refiled or amended the patent with the U.S. Patent and Trademark Office, changing it so that it sounds more like the token ring scheme and correspondingly less like his original patent. Undoubtedly, Soderblom would contend that he was only "clarifying the original." Those of us who were born prior to yesterday, however, will have no trouble

(Continued on Page 9)

PRO (From Page 7) concerned with where the token originates, nor is it limited to having the transmitted data sent to a specific node.

Those taking a narrow view of the invention's scope mistakenly believe that the invention was limited to the specifically dis-closed 1967 version in the original patent applications. They do not recognize that in a patent application an inventor is required only to describe a and this best mode. does not limit his invento that particular mode.

To establish this point and thereby quell further controversy as to the pioneering nature of the So-derblom invention, Wille-mijn filed reissue application in the U.S. Patent Office to obtain patent claims that present the invention in its widest aspect and which contain no reference to a "master unit." Protests against the reissue were filed by a number of U.S. and foreign companies, among them Sperry, International Computers Ltd. and Siemens A.G.

The Patent Office ren-dered a decision last December holding that all of the claims, both those in the original application and the additional claims of the reissue application, are allowable over all the prior art that now com-prises more than 60 U.S. and foreign patents and publications. The formalities associated with allowance and issuance are now underway, and the patent will be issued in the near future. The patent will be

in force through 1998.

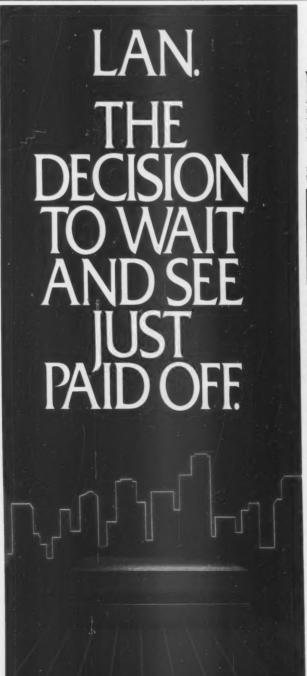
Willemijn has recog-nized the importance of token ring local-area net-work standards in relation work standards in relation to its licensing activities. In 1982, Willemijn established the policy of offering uniform licensing terms to all companies desiring a license. By this, Willemijn complied with the requirement of the standards-promulgating bodies, the IEEE and the European Computer Manufacturers Association ufacturers Association (ECMA), that nondiscriminatory licenses be available where any patent is relevant to a standard. Those groups also require that the licensing terms be reasonable. In response to a specific request from ECMA, Willemijn reviewed its licensing terms with ECMA and gave it written assurance that such terms would be available terms would be available to all who amicably enter into a license. Following this, ECMA adopted a to-ken ring standard (ECMA 89). Willemijn has provided similar written assurance to the IEEE. Many licenses have already been granted and more are being negotiated.

It is clear that the Willemijn patents cover token passing ring local-area netpassing ring local-area net-works as contemplated by the ECMA 89 Standard, Synchronous Data Link Control Loops, the Cam-bridge Ring and other local-area network's as well as the local-area network of IEEE 802.5. Infringe-ment by the Cambridge Ring network is the subject of litigation now pending in the UK against Lo-gica VTS Ltd. and Logica UK Ltd. Actions against others are in preparation.

It is Willemijn's desire, wherever possible, to re-solve the matter of licensing on an amicable basis, but it does have the resolve and the resources to engage in litigation when that is its only alternative. If an amicable attempt to resolve the matter fails, however, a license will thereafter be available only at substantially higher terms than in the standard agreement. Willemijn may in litigation also seek an injunction barring sales of infringing products.

These terms are applicable only to manufacturers and sellers of stand-alone nodes; terms applicable to sellers of components, for example, circuit boards, will be announced soon.

It is unreasonable to exect Willemijn to license its patents at virtually giveaway rates merely



ow there is a company that can satisfy your LAN needs both today and ten years from today. A company with flexible solutions backed by over 20 years of networking experience.

Codex.

In the 4000 Series LAN, we offer a system that lets you configure and control the precise mix of LAN technologies that

suit your company needs. A system, for exam-ple, that lets you combine a broadband backbone for data, video and voice applications, and less expensive Ethernet base band feeders to support

individual work areas A system that supports a wide array of industry standard interfaces. So you can

connect practically any vendor's

equipment.

Later, when your needs for internetworking and network management expand, those needs can best be met by the company that has literally written the book on adaptive routing, network management, protocol intervention, and statistical multiplexing.

Code

We just made the decision to get into local area networking a safe decision

For more information, call 1-800-821-7700, ext. 879. Or write: Codex Corpo-ration, Dept. 707-79, 20 Cabot Boulevard, Mansfield, MA 02048



At NCC, see us at the Motorola Information Systems Group booth.

cause of their present relevance to an industry standard. It is the superiority of the token passing ring technology that is leading the industry toward adop tion of that technology. And its licensing to all comers at reasonable, nondiscriminatory rates is a fair exercise of the patent system. It may well be that those who object should examine the reasons for their objections; they may find that the vehemence of their objections is propor-tional to the value of the technology and the corresponding need to use it.

CON (From Page 7) coming to the conclusion that the purpose of such "clarification" is certainly related to making the pat-ent sound more like IEEE 802.5. In my view, the U.S. Patent Office will have exercised poor judgment if it has, as reported in some trade press articles, allowed amendments materially affecting the legal relevance of the patent to

IEEE 802.5.

IBM has reportedly paid Soderblom a substantial sum of money for licens-ing rights to his patent. The peripheral loop on the IBM 8100 clearly uses a round robin ring poll initiated by the processor (as master station), which is similar to what Soder-blom's patent describes. IBM concluded either that Soderblom's patent was valid and did apply to the 8100 peripheral loop or that it would be less expensive to pay Soderblom a large sum than to contest

his claim in court.

But the 8100 loop is significantly different from the token ring proposed by IBM and now in the form of the 802.5 draft standard. IEEE 802.5 does not have a master station as described in Soderblom's original patent. So the question of whether question of whether Soderblom's patent is valid and if it reads on IEEE 802.5 remains to be deter-

mined.

There is no question that Soderblom believes that it applies, however. For an IEEE standard to include something covered by a patent, it is a require-ment that the license to the patent be available to vendors at a "reasonable" fee. When this issue came up with regard to Ethernet and a proposed IEEE standard, the practical meaning attributed to "reasonable" was empirically able" was defined. Xe empirically Xerox Corp., holder of the Ethernet pat ents, agreed to make li-

censes available to other vendors for a one-time fee of \$1,000

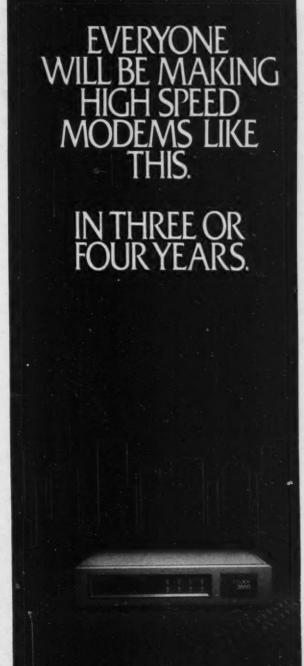
Soderblom clearly has a different concept of rea-sonable. Originally, he asked for an initial license fee of \$25,000 and the greater of \$45 or 7% of the value of each attached node as a license fee. Since an attached node could conceivably be a large computer costing as

much as \$10 million or more, a literal reading of Soderblom's initial de-mand quickly adds up to some very large numbers. Soderblom negotiated his demand down somewhat, but it is certainly clear that Soderblom has hopes of becoming a very rich - or richer? man as a result of all this.

It is probably beyond the power and authority of

the IEEE and the international standards bodies to negotiate with Soderblom on this matter. In my opinion, if Soderblom continues to insist on anything near the kind of license fees that he has been quotring and if it is legally decided that his patent does apply to the IEEE 802.5 draft standard, there will not be a token ring standard. dard out of IEEE at all.

Soderblom's ambitions to make millions on his patent (expressed, to the best that I can determine. legal maneuvers and n legal maneuvers and public relations efforts rather than any serious at-tempt to develop prod-ucts) may fall short of the mark. His prohibitively high proposed license fees may prove to have been the straw that broke the camel's back.



ow did Codex come up with the 2600 Series, a new generation of moderns running at speeds from 4800 to 16,800 bps that's so much more advanced than the competition?

By designing a revolutionary VLSIbased signal processing architecture teamed with the powerful Motorola MC68000 microprocessor.

A design that incorporates a unique Adaptive Rate System, which continuously adjusts the transmission speed of the Codex 2660 to the maximum rate the line will support. Allowing you to optimize

will support. Allowing you to optimize throughput all the way up to 16,800 bps, without having to lift a finger. A design that ensures data reliability with Trellis Code Modulation (TCM)—a significant advancement over uncoded modulation. lation techniques in common use today.

In multipoint applications, the Codex 2640 can even handle mixed 9600, 7200 and 4800 bps inbound rates. So each drop can operate independently at maximum speed and efficiency.

Of course, with the Codex 2600 Series, network control is standard. So you can monitor line and modem performance from the front panel or from a central Codex DNCS system. Plus there's an optional downline-loading feature that lets you conveniently modify or enhance the functionality of remote, unattended modems.

The Codex 2600 Series.

In three or four years, our competitors will probably have moderns just like them. If you'd rather not wait, contact Codex today. We'll send you detailed information about these 2600 features and more. Much more

Call 1-800-821-7700 Ext. 886. Or write: Codex Corporation, Dept. 707-86, 20 Cabot Boulevard, Mansfield, MA 02048.



At NCC, see us at the Motorola Information Systems Group booth.

© 1984 Codex Corporation

CHANGING OUR NAME WAS A STICKY BUSINESS.

After 14 years as Intertel, it wasn't the easiest thing to do. Sure there were the obvious problems; like licking 19,453 labels so we could show off our fancy new logo. But we also found that Intertel was more than just a name to the hundreds of companies that depend on our network command center systems and diagnostic moderns for high-availability data communications. It was a constant reminder to them of our commitment to providing the products, support, and services they need to keep pace with the ever increasing size and complexity of their private line networks.

However, we had to face the fact that our old name described only a part of what our current products can do and what the systems we are developing will

offer in the future. We decided that changing our name would be an impor-tant first step in linking our past accomplishments with future networking

Now, when you think of controlling, managing and measuring the performance of large networks, remember what we did as Intertel. When you need to assure fault-tolerant operation of networks with both analog and digital links, remember Intertel did it first. But when you're ready to find out more about our networking capabilities, please think of them as INFINET.

Six Shattuck Road Andover, MA 01810 (617) 581-0600



Western Electric: What's In a Name?

The day they removed the huge bell that used to adorn the lawn of former Western Electric Co.'s PBX manufacturing plant in Denver was a traumatic one for the employees there. As one described it, "It was a real kind of

Last Dec. 14, AT&T dissolved its 114-year-old manufacturing unit, Western Electric Co., and its corporate charter was replaced by
AT&T Technologies, Inc. "We could have chosen to call this new Western enterprise Electric. AT&T Chairman Charles L. Brown said at the time. "We chose in-stead to put all our resources and reputation behind the AT&T

Despite such sanguine senti-ments, employees of the former Western Electric appear to be hav-ing difficulty putting their all be-hind the new name. Said one employee: "I'm nine years from retirement. At the end, I wanted to be able to say I spent my whole career at Western Electric."

'The name has changed, but no one appears to be respecting that very much," said one senior employee, who not only still refers to ployee, who not only still refers to his employer as Western Electric, but claims to have no intention of doing otherwise. "It might take a whole generation before the name "Western Electric" disap-pears from people's minds." Of course, what's in a name? Or

better, perhaps, what's in a name change?

Well, aside from 50-lb. bells collecting dust in office corners around the country, the neat round holes punched in employee badges to eliminate the bell, business cards where Western Electric is scratched out in ballpoint pen, ("It's a disgrace," grumbled one high-level employee), aside from all that, there appears to be a crisis of identity at the company, threatening to the company, threatening to erode employee morale.

"They're scared to death. Everyone in that organization is scared to death," observed Harry Newton, president of The Telecom Library in New York. "The re-ality is that the accusation that ev-eryone has laid at Western Electric's feet for the past 10 years namely that they've been slow to develop products — has finally come home to roost. There are very few areas within Western that

are state of the art."
"There's a lot of confusion." admitted one employee. "Some say it will clear up in a year; others say it will clear up in five years. We're trying to figure out what we're supposed to be doing.

We're in an industry where every-thing is changing. The attitude we have to have is that it is always go-

ing to be like this. We're not the only ones."
"Whether it's morale or confu-

sion, it is manifesting itself in the fact that some people are leaving, some are staying and some aren't doing anything for fear of rocking the apple cart," Newton said. "They are literally not doing anything, just showing up for work, scared that if they do anything they'll be noticed and sent somewhere else or laid off. They are sitting there, waiting to see what this monolith has in mind for Joe Blow Middle Manager.'

Whatever the uncertainty their footing, employees of the former Western Electric still display a good deal of loyalty and goodwill toward their company. "I'm very happy to be at AT&T right now," said one veteran of 29 years. "I look at it as a tremendous challenge.

The world didn't suddenly light up or go dark on Jan. 1," Pete Goodale, a Nynex regional tele-

phone company spokesman, said.
If not light or dark, then the
world turned a definite shade of gray on Jan. 1, 1984. And some of the murkiness brought about by the AT&T divestiture involves Local Access and Transport Areas, or

These exchange areas, which correspond roughly to standard metropolitan statistical areas, are a result of the 1982 consent decree between AT&T and the Justice Department. The reason for the formation of Latas was, in keeping with the divestiture's goal of introducing competition into the telecommunications market, to provide the regional operating companies with toll services of their own.

"Latas are an artificial way of giving the [Bell operating compagiving the [bell operating compa-nies] some toll services, because let's face it, the money is in toll services," Robert Ahlers, a staff manager at AT&T Communications, said.

There are 167 Latas for the Bell operating companies and an additional 20 for areas served entirely by independent telephone com-panies. In several states, there is one Lata for the entire state. In others, such as Massachusetts, each Lata corresponds to a sepa-rate area code. Still other Latas sweep through a half a dozen area codes, such as the Los Angeles area Lata, which runs from Orange County in the southern portion of the state up to the middle of the state on the eastern border.

All inter-Lata calling is the domain of long-distance carriers, main of long-distance carriers, such as AT&T, MCI Communica-tions Corp. or GTE Sprint, and calls placed within the boundaries of a Lata are handled by the local operating company

Whether the local operating companies will eventually be allowed to enter the inter-Lata toll market is, at this early stage, largely a matter of speculation.

"I think it's just a question of how long it takes before the [Bell operating companies] figure out how to get into the inter-Lata mar-ket," Don Gooding, a senior analyst at The Yankee Group, said: "We're guessing it won't happen until 1990, because it's going to

take that long for competition to get serious enough in the intra-Lata market."

As a result of the formation of Latas, several local operating companies have already restructured the calling services available to customers, eliminating many discount intrastate services that are now inter-Lata and beyond the Bell operating companies' juris-diction. Whether intra-Lata rates will rise measurably from their current level is another question that only time will answer.

Perhaps you have wondered about RS-449, an interface that enjoyed a brief moment of glory in the '70s when it was hailed as the interface that would supplant RS-232 as the industrywide standard. But RS-449 never managed to take over from the RS-232 de facto standard because, as one source familiar with the circumstances of RS-449's demise put it, "the U.S. government got involved and, as usual, managed to screw things up.

In 1976, heavyweights in the communications world, including the Institute of Electrical and Electronics Engineers and the Electronic Industries Association, convened to produce a new interface that would allow for higher signaling speeds over longer dis tances than those allowed through RS-232. Three new standards RS-422, RS-423 and RS-449 were proposed, and in November 1977, RS-449 was adopted by the EIA as the new standard. According to Fred Lucas, chairman of the EIA subcommittee on functional interfaces, although RS-449 was useful for transmission speeds above 20K bit/sec, its 37-pin pri-mary channel and 9-pin secondary channel made it too large and unwieldy to gain much popularity.

"Thirty-seven and nine is just too large a connector," Lucas not-ed. "Also, because of the large installed base of data terminals and communications equipment that already existed supporting RS-232, there was a lot of resistance to change. Needless to say, RS-449 has not been widely accepted. It was accepted by the government, but not widely supplied to the government.

AT&T Technologies, formerly Western Electric, appears to be the only firm that manufactures equipment actually sporting an RS-449 interface — the Dataphone II modem. But all Dataphone II data sets come with RS-232 adapters.

To darken RS-449's already dim chances for widespread recognition, the EIA is currently working to update RS-232C to RS-232D Lucas' subcommittee does intend to revise RS-449 for use above 20K bit/sec, but nothing specific has materialized to date.

The Great Quid Pro Quo

Political Washington, D.C., is often masterful. Unfortunately, the genius of politicians, regulators and vested interested parties goes totally undetected, largely because the participants in the democratic process want it that way.

ocratic process want it that way.

But the recent postponement of the access charge decision by the Federal Communications Commission (FCC) is an example of legislative and regulatory Washington at its best. All parties gained something and lost very little. Indeed, the FCC decision was a classic political and economic compromise, allowing everyone to proclaim themselves victorious — some privately and others publicly.

Let's examine the interested

Let's examine the interested parties to see what they gained and what they gave up when the FCC, at the suggestion of leading politicians on Capitol Hill, post-poned the implementation of the \$2 per line per month access charges for residential users and the \$6 per line per month for single-line businesses. Businesses with more than one line have to pay the \$6 per line per month, as of lune 13.

of June 13.

AT&T Communications is a winner in the long term, even though it claimed that it was a loser. AT&T primarily wanted to defeat legislation, and it did: S. 1660 and H.R. 4102 are now dead. A so-called legislative solution to the access charge issue would have been a disaster for AT&T.

In addition, AT&T earns what could be a significant sympathy vote from the FCC. This may pay rich dividends in the long term when the FCC considers deregulating AT&T or allowing it to deaverage its rates selectively in order to meet the competition head

In the short term, AT&T Communications appears to be a heavy loser. It will bear the burden of continued subsidies flowing to local exchange companies, absorb significantly higher costs than its emerging, though much smaller competitors and reconfigure some of its complex tariffs filed last October. The FCC decision does, however, propel AT&T toward an early consideration of local telephone bypass just to protect itself from paying the heavy subsidies in the long term. All in all, it was not a bad decision for AT&T Communications.

AT&T Communications.

The regional Bell operating companies and the independent telephone companies are also winners for the most part. Although the telephone companies said that they want the \$2 and \$6

Pearce is president of Information Age Economics, Inc., Washington, D.C., and a regular columnist with Computerworld On Communications.



monthly line charges, they much prefer to collect their billions of dollars in subsidies from a few companies, mainly AT&T Communications, than from 100 million subscribers.

For the most part, the telephone companies were not ready to implement access charges locally and needed more time to reorganize under the new industry structure mandated by the Modified Final Judgment in the AT&T divestiture.

The regional Bell operating companies used the loss of customer access line charges as an excuse to press their case on Capitol Hill for reentry into the lucrative and rapidly growing inter-Local Access and Transport Area toll market. Many politicians promised that once the regional Bell operating companies implemented equal interconnection for the competitors of AT&T Communications, they would then support the regional companies' reentry into all toll markets.

Finally, the local telephone companies won a major victory in defeating legislation, especially since they believed that it would seriously restrict their long-term flexibility. Any legislation that prohibits or limits the imposition of access line charges would impair a telephone company's ability to raise revenues.

or aise revenues.

There were, of course, some losses for the local telephone companies. These include a dramatically increased threat of local bypass, particularly from AT&T Communications. Furthermore, the telephone companies can ex-

pect continued strained relations with state regulators simply because of the conflicting goals: State regulators want the lowest possible local rates, while the telephone companies want the highest possible states.

highest possible rates.

The rural telephone companies were also clear winners, largely because a rapid transition to full competition would have hurt them the most. Politicians appear to be sensitive to the problems of the rural telephone companies and have ordered the FCC to study the impact of access charges on the rural environment. This may mean that special subsidies will have to be generated in order to allow the rural companies to survive what they have characterized as a life-or-death struggle.

The interexchange carriers that compete with AT&T Communications — for example, MCI Communications — for example, MCI Communications Corp. and GTE Sprint — are big winners, at least in the short term. They score a huge victory for the next two to three years because of the continuation of the low-cost Exchange Network Facilities for Interstate Access tariff, which will give them a 55% discount over AT&T Communications for local exchange access.

In the long term, however, AT&T's competitors have to confront the prospect of intensified competition as AT&T Communications attempts to deaverage its rates while beginning to fight for deregulation at the same time.

All of this means that the other common carriers must rapidly construct their own long-distance

facilities and perhaps even local bypass facilities.

bypass facilities.

Major users of telecommunications services, while having to pay higher costs in the short term, gain because they are opposed to a legislative solution to the access charge issue. The major users know that their long-distance telecommunications costs are inevitably going to come down, regardless of what the FCC did as a stopgap measure.

The public interest groups believe that they scored a victory. They would have liked legislation, but their primary goal was a delay of the \$2 and \$6 customer access charges. Unfortunately, the consumer will have to pay anyway, one way or another. It appears that increased local exchange rates are inevitable.

The state regulators wanted a postponement of the interstate end-user access charges because of complaints about rapidly increasing local exchange rates, so they also won. In addition, the FCC decision gives the states an opportunity to postpone requests by the local telephone companies for intrastate end-user charges.

Nevertheless, state regulatory problems will continue unabated, argely because of the pressure on

Nevertheless, state regulatory problems will continue unabated, largely because of the pressure on the local telephone companies to increase their revenues in order to upgrade the massive amount of outdated and inefficient plant that must be phased out of the rate base very rapidly.

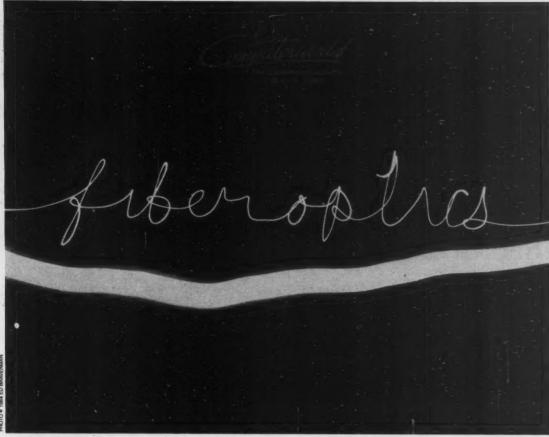
The U.S. Congress is a clear winner since it got what it wanted — a deformed for cores otherways a political problems.

■ The U.S. Congress is a clear winner since it got what it wanted — a deferral of access charges so politicians running for reelection could justifiably claim they have kept local rates down and saved public money.

■ The FCC can claim victory because it pleased the politicians, who control its purse strings. It did not antagonize any of the major participants, with the possible exception of the state regulators.

The White House won because President Reagan did not want to be forced into signing a bill that would hurt his biggest backers—the major U.S. corporations. Reagan could not veto the bill, largely because it had been characterized as a pro-consumer legislative package. No one, not even a "popular president," can afford to offend consumers in a presidential election year. Reagan was able to avoid a difficult decision.

All of this is what Washington does best. Groups with widely divergent views and interests can sit around a bargaining table and all of them can come out smiling. Since they are all good actors, however, they can wipe the smiles off their faces by the time they speak to the press. After all, the last thing they want the public to know is the rules of this very complicated but enjoyable game.



THE LIGHT BRIGADE

BY KEVIN MURPHY

Fiber optics has already had a major impact on long-haul telecommunications. Most telephone trunking applications are now turning to optical waveguide fiber as the transmission medium of choice. AT&T is currently installing a fiber-optic backbone through the Northeast Corridor of the nation's telephone network, and work is starting on a transatlantic fiber-optic cable.

Now that fiber is an accepted transmission medium, it is being used increasingly for shorter distance computer data transmission and local-area networks. In January, Corning Glass Works introduced a new type of fiber that facilitates the use of already developed telecommunica-

Murphy is a product and market specialist in the Telecommunications Products Division of Corning Glass Works, Corning, N.Y. tions-type connectors and equipment for low-cost data communications systems.

Both supply and demand sides of the market are stimulating interest in local network fiber-optic links. Manufacturers are making hardware targeted specifically at the needs of short-haul transmission. Prices are dropping with the accumulated production volumes for all applications. Local network users want to take advantage of what fiber has to offer: higher transmission rates, longer lengths requiring fewer repeaters and immunity to electromagnetic interference.

The market for short-haul fiber-optic systems is not as homogeneous as that for long-distance telecommunications. The local-area network is a broad and hazy concept, since it encompasses a number of transmission services in a wide variety of system configurations. Computer data transmission may involve connections

within a mainframe or communications from a mainframe to and within peripheral devices in the same or different buildings.

Industrial applications range from carrying process-control data to video monitoring for plant security. The Mitre Corp. developers, who helped pioneer the local-area network concept, studied connections within an aircraft carrier. The local network description can cover local-loop connections to telephone subscribers, links to cable television subscribers' homes, any networks within a campus or office building or even transmission systems within vehicles.

The market for short-haul fiber-optic systems is forecasted to be on the verge of significant growth. Gnostic Concepts of Menlo Park, Calif., puts 1983 fiber-optic sales to the U.S. computer market at \$12 million and predicts sales will reach \$44 million in 1987 and \$78 million in 1990. Slightly faster growth is

Fiber Optics

forecast for fiber optics in industrial electronics, from \$14 million in 1983 to \$62 million in 1987 and \$115 million in 1990. Sales are predicted to soar for fiber-optic components used in telephone local-loop and subscriber CATV links, from \$12 million in 1983 to \$93 million in 1987 and \$407 million in 1990.

Some increase in fiber sales to local networks will come from the general growth of the communications market, but the increasing benefits of fiber optics will bring even more growth. There are a half-dozen key attractions, includ-

Broad bandwidth to handle ·high-speed transmission.

Longer distance transmission of

baseband and broadband signals than allowed by coaxial cables, in which attenuation increases with transmitted frequency. This attenuation problem is avoided in fiber optics.

Low noise and immunity to electromagnetic interference, since signals are transmitted as infrared light rather than electricity.

■ Excellent security because it is extremely difficult to tap optical waveguide fibers without degrading performance so much that uswould notice.

electrical transmission. ■ No avoiding problems with ground loops, voltage differences, electrical safety and spark hazards in explosive atmospheres.

■ Small size, allowing cables to be

installed through congested loca-

Despite these advantages, fiberoptic communications in shorthaul systems has generally developed at a slower rate than in long-distance telecommunications. This has been due to the historically modest distances and rates that coaxial cable has cost-effectively serviced. Fiber-optic cable is actually priced at a level comparable to coaxial cable. The cost trade-offs must weigh the terminal and connecting hardware, which can account for a significant portion of the total cost of a short-haul fiber-optic system. In the future, as local network links grow in length and data rate required, fiber may surpass coaxial capability and cost-effectiveness

Difficulty in coupling light be-tween sources and fibers has, to some extent, hindered the adoption of optical waveguide technology. The light-carrying cores of optical waveguides are small, only 50 micrometers in diameter in common telecommunications fiber and just a few micrometers wide in high-capacity, single-mode fiber. Inexpensive LEDs emit light from a broader area and cannot couple efficiently to small core fibers. Semiconductor lasers work fine for long-distance links, but they are prohibitively expensive for multiterminal short-haul systems. Fiber manufacturers have begun to develop alternative fiber designs to overcome this.

Fiber Optics Graces Pittsburgh Campus

By Katherine Hafner
PITTSBURGH — Campus of the
Future. It's a distinctly intimidat-

ing phrase.

Such connotations notwith-standing, the University of Pitts-burgh has embraced that very slogan in its headlong plunge irto the world of fiber-optic communications. Last December, the University of Pittsburgh and AT&T Information Systems issued a joint memorandum of in-tent to build an \$8-million comprehensive fiber-optic network that will connect 55 buildings on that will connect 55 buildings on a total of 150 contiguous acres. It will be completed in the next three years, and its hub will be AT&T Information System's light-guide fiber-optic cable network system, as well as the System/85 private hearch exchange.

private branch exchange.

"As far as we know, we're the first university in the world to utilize fiber-optic technology to tie together virtually all of its video, voice and data communications,"
Jack Freeman, senior-vice chancellor for administration at the

university, explained.

In addition to the joint venture with AT&T, in February the university signed a three-year agree-ment with Digital Equipment Corp., whereby the university will acquire an additional \$8 million worth of computing and networking equipment from the minicomputer vendor at a 50% discount. Equipment to be used will include VAX superminicom-puters, as well as the Rainbow 100 and Professional 350 microcomputers

Installation of the network will be an ongoing process, Freeman explained. Scheduled to be completed by mid-1986, the network will allow users to communicate via telephone, computers or closed-circuit television wherever telephones are installed. The university currently has 10,000 telephones in place, and the fiber-optic network will add another 10,000 circuits, Freeman added. Students will be able to read books on television monitors or send homework to professors via electronic mail.

With a student population of 35,000 and schools for everything from medicine to law, the univer sity is a small city-state of its own.

'A university is a big busi-ss." Freeman asserted. "And no big business can operate efficiently without access to the latest in telecommunications.

Taking into account the 2,000 faculty members and 6,000 on the university staff, the overall community of people to be served by the network numbers 43,000, and each member of that community has his own needs. The beauty of the system, as Freeman sees it, is installation and operation of the

system, according to Freeman.

Steadfast in his support of AT&T Information Systems, Freeman calls it "a very solid company" in the face of divestiture. ny" in the face of divesticution.
"While they are undergoing a period of uncertainty and transition, their commitment to the future and technical capabilities is, in our opinion, unsurpassed," he

Freeman is also a strong advo-cate of fiber-optic technology, the high cost of which has deterred many a prospective customer. "It is a cost-effective soluaccommodate full-color, full-motion video, and we'll use some data compression techniques to

reduce the amount of bandwidth required to do it," he said.

Details for the network are still sketchy. To date, a needs analysis survey of 3,000 members of the university community has been conducted, and underground conduit routes for the fiber-optic

conduit routes for the fiber-optic cable have been assessed.
"A good deal of the preliminary work has already gone into the conceptual design at this point," Freeman said. "But the precise details and design are something still to be undertak-

en."

When the fiber-optic system is installed, the university will discontinue its existing Centrex system. (Coincidentally, the university has a contract with Bell of Pennsylvania obligating the university to continue operation of the Centrex system for two more years.) "Obviously, we'll continue to work closely with Bell Atlantic with respect to our local and long-distance services," Freeman said.

Freeman expects that 2,000 mi-

Freeman expects that 2,000 mirreeman expects that 2,000 mi-crocomputers — acting either as stand-alone processors or work-stations — will be used by the students, and an additional 5,000 will be used by the faculty and staff. The university, however, will not require its students to buy the computers.

buy the computers.

In addition to its agreements with AT&T and DEC, the university plans to purchase a data mansity plans to purchase a data man-agement system from Systems and Computer Technology Corp. in Malvern, Pa. According to For-ejt, the system will "link adminis-trators and other decision-makers in a shared information environ-

Additional announcements with computer vendors are with computer vendors are still pending. "I'm sure there will be other computer and communications vendors involved as the project progresses," Foreit said. "This campus will provide an environment for prototype testing of new products in both telecommunications and computing."



The Cathedral of Learning is the hub of the Pittsburgh campus.

that although the network will be that although the network will be based on System/85, it will be designed to permit such end-user devices as microcomputers, printers and telephones to come from a variety of vendors.

"Part of the planning is to create a highly flexible system that will permit a complex institution like this to utilize the products from a great many vendors, while

from a great many vendors, while the hub of the system is AT&T, Freeman said.

In return for its investment in AT&T Information Systems and DEC, the university will have access to the vendors' design and development staff. This staff will participate actively in the design,

Freeman asserted. have a lot of conduit running around the campus that was laid over a period of years for carrying copper cable as well as steam. By using existing conduit, we can greatly reduce the cost of digging

greatly reduce the cost of digging up the streets and the campus and installing new conduit."

"Fiber optics will be the backbone to provide the extremely high bandwidth that will allow us to carry voice, data and video all on the same system," commented David Forek, the university's associate senior vice chancellot for telecommunications and computing. "The fiber optics give us sufficient bandwidth to

The slow evolution of standards has made engineers hesitant to make product choices and utilize short-distance fiber-optic systems unless their advantages clearly dictate it. Fiber and connector standardization are key to providing the flexibility to reconfigure many short-haul systems.

New technology, increased production and the gradual development of standards are helping overcome these problems. New fibers that are matched to the output characteristics of the LEDs preferred for short-distance transmission are on the market. Component prices are decreasing as production quantities increase. The joint industry-military standardization effort headed by the Electronics Industries Association in Washington, D.C., is succeeding. Fiber and connector makers are gradually settling down to a few preferred types, which are available from different suppliers.

The developments in technology, production and pricing span the elements of fiber-optic systems. There are four key elements to short-distance systems: the light source, couplers or connectors, receivers or detectors and the fibers themselves.

PREFERRED light source for short-distance fiber links is usually the LED, which longer lived and much cheaper than the semiconductor diode lasers used in long-distance transmission. LEDs emit less power than laser diodes, but as long as a reasonable fraction of the LED output can be coupled into the fiber, they should be adequate. Coupling efficiency to 50-micrometer core fibers can be a limitation, resulting in coupling losses several decibels worse than larger core fibers. In systems with high losses or many nodes, it is con-ceivable that the higher output powers of diode lasers may be re-

Coupling light between fibers or from light sources to optical waveguide fibers is hard because the small core diameters allow only small tolerances for alignment. Permanent long-haul systems rely on splicing, but short-distance systems require connectors that can be taken apart and put together again so their configuration can be altered to meet changing user requirements. Each connector typically adds a loss between 0.5 and 2 decibels, so system designers must trade off added loss for flexibility of reconfiguration.

Matters get worse if the network design requires the use of couplers, which are devices joining three or more fiber ends. Simple networks may use three-port T-couplers, but losses build up rapidly when many T-couplers are used. The usual choice for multiterminal networks is the star coupler, a design in which light entering the coupler is divided among many ports at nearly equal power

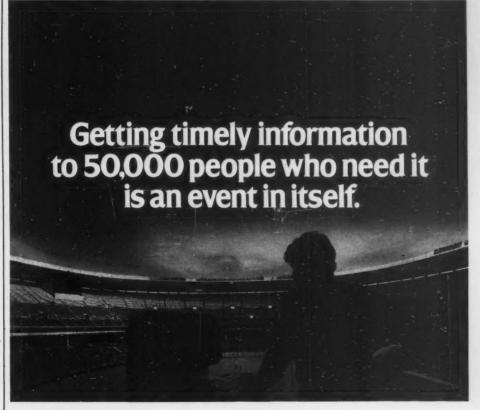
levels. Because of coupler losses, fiber-optic network configurations tend to differ significantly from those of coaxial-cable networks

The light detectors or receivers in short-haul fiber-optic systems are usually pin silicon photodiodes, chosen for their high speed, good response and modest cost. Phototransistors and photodarlingtons detectors are cheaper, but are limited to much lower data rates. Avalanche photodiodes are used to attain high sensitivity in some long-distance systems, but their high cost can be difficult to justify for short links.

The fiber plays a critical role as the transmission medium. Cheap plastic fiber can be used for short, low-speed links, such as inside an automobile, but most systems use high-performance glass fibers. Low attenuation, a critical concern of early developers, is taken for granted in glass fibers made today for use over short to moderate distances. The main practical considerations are cost, ease of coupling and connecting and transmission bandwidth — factors that are all related to the structure of the fiber and its light-carrying core. As core diameter increases, coupling and connecting become easier because more light can be captured and the same mechanical tolerances result in less power lost.

The larger the core and light acceptance angle of the fiber, the more pulse spreading the fiber will tend to have, thus limiting bandwidth. However, the relationship is complex and depends heavily on the manufacturing process. Cost also tends to increase with core diameter and light acceptance angle due to material costs. These factors must be carefully evaluated in fiber design.

Users can select from three basic types of fibers, each with distinct characteristics. Single-mode step-index fibers have excellent bandwidth because their tiny cores carry only a single mode of light and are comparatively inexpensive. However, core diameters of only a few micrometers impose tight coupling and connecting tolerance, making connectors expensive and requiring costly laser light sources. These limitations have been serious enough that



999

Behind the action, pageantry and spectacle of the 1984 Olympic Games is ne most extensive data

one of the most extensive data communications systems ever built.

The Electronic Messaging
System—12 computers, 1,700
terminals, 300 printers—was
created for the 1984 Olympics
by AT&T. And tied together with
Infotron networking equipment.

by AT&T. And tied together with Inforon networking equipment. The EMS is designed to replace the old system of handcarried reports in the world's first multi-site Olympics. It does everything from displaying event results, to supplying athlete biographies for reporters, to providing schedules, qualifying information and personal messages to the participants themselves.

The system's true complexity lies in the numbers of people it serves: the 50,000 officials and reporters, coaches and athletes of the Olympic family. But the demands placed on it are very much like the demands all infotron customers place on their networks.

Performance. Flexibility.

Performance. Flexibility. Reliability. Advanced Network Integra-

tion" from Infotron—a sound basis for networks of any size or configuration. Simple.

Or breathtakingly complex.

We're proud of the part we're playing.

MIN.						
	NFC	TR	ON	SYS	TEN	15

9	notron Systems Corporation, North Olney Avenue, Cherry Hill, NJ 08003 or call toll-free: 1-800-345-4636.
A C	end for our informative book, laking it Through the Maze of Data ommunications. W \$/2 ame_
T	itle
0	ompany
JA	ddress.
0	ityStateZip
T	elephone

Infotron communications networking. First in performance and reliability.



WHATEVER THE RANGE OF YOUR NETWORKING NEEDS, DIGITAL HAS THE BEST ENGINEERED SOLUTIONS.

Now that you've invested in computers, a good network is how you'll get the most out of them.

A good network today is a single computing entity. It shares resources automatically. It is so flexible it can change size, shape, even purpose with minimal impact on your users and your pocket-book. More than accommodating new technologies, a good network invites them.

The very best networks do this in near invisible ways.
This kind of transparency is the engineering goal of the networking products Digital makes. It is the elegance built into the over 14,000 network nodes Digital already supports around the world.

DECnet™ software is the centerpiece of Digital networking products. The new

Phase IV Version is compatible with virtually every processor and operating system Digital makes. This allows you to build networks using essentially any combination of Professional 350s, PDP-11, VAX, DECsystem-10, and DECSYSTEM-20 computers. DECnet Phase IV also accommodates the Ethernet protocol.

DECNET LETS COMPUTERS COMMUNICATE AS EASILY AS PEOPLE.

DECnet is distinguished by a remarkable set of high-level user functions. These are available to every network user. From every point on the network. On a DECnet network of any size.

Adaptive routing, for example, eliminates the need for direct physical links between each system pair. DECnet picks

the most efficient route and automatically avoids failed lines.

Virtual terminal mode gives you remote terminal-toterminal access. Logging on anywhere, you can reach and manipulate the data of any authorized node on the net.

Program-to-program communications enable you to swap data between programs written in different languages, running under different operating systems.

DECnet is state of the art in networking software. It manages your network so efficiently, you can manage DECnet from a single terminal.

PRODUCT RANGE GIVES YOU EXTRAORDINARY NETWORKING FLEXIBILITY.

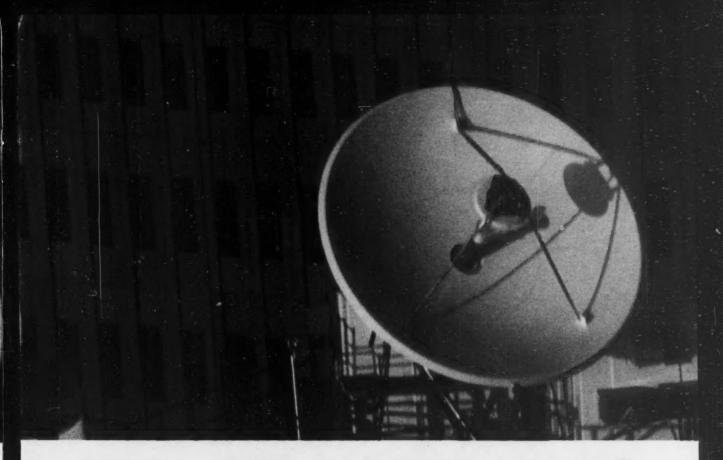
Within a single networking architecture, Digital makes

some eighty discrete products.

At the local level, Digital's
Ethernet repeaters allow you to
extend your LAN to link departments, buildings, or projects as
needed. New systems simply clamp onto the coaxial
cable with interfaces that take
just minutes to install. Add
Digital terminal servers and
you break the dependency
between terminals and specific processors. This allows
any user on the LAN to access
the resources of any host.

Add Digital communication servers and you can connect LANs to wide area networks.

Digital supports cooperative computing with special gateways that translate protocols between unlike architectures. One gives you access to the X.25 packet-switching technology for cost-effective international communications.



Others connect Digital equipment to IBM's SNA. More than just permitting communications, these gateways give your users direct access to both the batch and transaction processing environments of IBM mainframes.

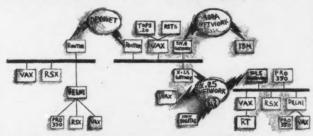
Digital networking products dramatically enhance the effectiveness of your distributed computing resources. They can be combined in almost endless ways to build a network comprised of just two nodes, or over a thousand. Users in the next

DECnet software keeps Digital networking simple. Simplicity keeps Digital networking reliable.

SETTING THE HETWORK STANDARD FOR EASE OF USE.

Digital believes that excellence in networking is best measured from the user's point of view. And by and large, communications on a Digital network is just plain automatic.

You can transfer files by simply noting the node of the



cubicle or on another continent can share information, applications and peripherals. They can integrate work at any level.

Smaller systems gain access to the powerful capabilities of centralized facilities. Large systems can off-load tasks to smaller dedicated systems.

receiver. You can reach, via DECmail™ software, any number of people just by naming them. With DATATRIEVE™ software you can sort and report information without regard for how and where it is filed.

To the user, how it all hap-

pens is of little or no concern. User commands remain consistent across operating systems, across distances supported by DECnet and despite the fact that your message might travel by fiber optic cable, private or public lines, and then by satellite link.

DIGITAL WILL GO TO GREAT LENGTHS TO BUILD YOUR METWORK.

With Digital software, no proposed network use is too unlikely. No combination of technologies is out of the question. And because Digital maintains service centers in every corner of the world, no remote node is too remote.

Digital will design, install, help manage and constantly evaluate the state of your network. You, your users, your future data communications management can all be Digital-trained. Digital will give you round-the-clock support with guaranteed service and warranteed product performance.

Most of all, Digital will provide you with networking

solutions so open-ended they will instill you with confidence about the most far-reaching computing decision you face.

BEST ENGINEERED MEANS ENGINEERED TO A PLAN.

Digital networking products, like every Digital hardware and software product, are engineered to conform to an overall product plan. This means Digital systems are engineered to work together easily and expand inexpensively. Only Digital provides you with a single, integrated computing strategy direct from desktop to data center.

For a copy of the brochure, "Digital: Tomorrow's Networks Today," call 1-800-DIGITAL. Or write: Digital Equipment Corporation, Attn: Media Response Manager, 200 Baker Avenue, West Concord, Massachusetts 01742.

THE BEST ENGINEERED COMPUTERS IN THE WORLD



Fiber Optics

single-mode fibers have rarely been considered for short-haul networks.

Multimode step-index fibers, which have a large core and an abrupt refractive index boundary between core and cladding regions, offer good coupling characteristics. These fibers vary in cost and are made in a variety of large core and cladding dimensions. Their transmission capacity is limited to tens of megabits per second, and attenuation losses are moderately high, which could in-hibit later system upgrades.

Graded-index multimode fibers have a graded boundary be-tween core and cladding that gives them a much higher transmission capacity than multimode step-index fibers, although not as

high as single-mode fibers. The fi-bers are relatively inexpensive, and the core diameters are large enough to make coupling and connecting a reasonable task.

The telephone industry has settled on a core diameter of 50 micrometers for graded-index fibers. Although this is fine for long-distance telecommunications links with laser sources and few con-nectors, it is inefficient for use with LEDs and requires careful connector design. To provide betcost/performance trade-offs for short-distance systems, Corning Glass Works is producing graded-index fiber with 85-micrometer core and the same 125-micrometer cladding used on tele-communications fibers. The larger core diameter greatly improves light coupling from LEDs without significant penalty in cost or bandwidth limitation for short

The market for short-haul fiberoptic links has not evolved as rapidly as that for long-distance transmission. However, the trend toward higher data transmission rates seems inexorable, as localarea networks begin operating at higher rates to accommodate the variety and density of data services over longer distances.

Current demands for short-haul fiber system performance can be satisfied by using established technology developed for operation at the 850-nanometer wavelength. Inexpensive gallium-aluminum-arsenide LEDs and silicon photodiodes operate there, and fi-

ber loss and bandwidth are adequate. Requirements for much broader bandwidth and longer distance transmission will push distance transmission will push system developers toward trans-mission at 1,300 nanometers, where fiber loss is lower and bandwidth is much higher. The longer wavelength has become the standard choice for long-haul transmission, and with time, 1,300-nanometer light sources and detectors will become inexpensive enough for short-distance

Fibers such as the 85-micrometer core graded-index type have been designed for good performance at both 850- and 1,300 nanometers. These double window fibers give the user the option of upgrading system capacity by adding new light sources and detectors without changing the fiber cable. ber cable.

HERE ARE A NUMBER of short-distance fiber systems already operating, and more will follow as the technology matures and the ogy matures and the demands for local net-work performance increase. As far back as 1979, the U.S. Army Harry Diamond Laboratories were able to justify installation of a fiber-optic network to interconnect computers and terminals. The crucial requirement was a need crucial requirement was a need for secure transmission of sensi-tive data and the need to install ca-bles within existing walls. The heavily shielded metal cables that could have met security requirements would have been very expensive to install, so optical waveguide fiber was chosen.

Large institutions are also picking fiber optics for data highways and local-area networks. Citibank Corp. in New York uses intra-building and interbuilding fiber-optic systems as data highways be-tween computer centers. The University of Chicago uses multifiber cables strung through steam tunnels on campus to provide voice and data links between a digital private branch exchange and remote nodes.

Fiber-optics local networks are already on the market. Siecor Fi-berlan of Research Triangle Park, N.C., Codenoll Technology Corp. of Yonkers, N.Y., and Ungermann-Bass, Inc. of Santa Clara, Calif., have a joint program. Industry gi-ants such as IBM, Xerox Corp. and Hewlett-Packard Co. and fiber companies such as Canstar Com-munications of Scarborough, Ont., Canada, are working on their own fiber-optic local-area networks.

Meanwhile, Canada, Japan, the UK, France and West Germany are all testing the prospect of broad-band fiber-optic local loops to homes. Fibers are being used to distribute CATV signals within apartment complexes in the U.S. In the long term, these trends may merge so that local nets will comprise the integrated broadband network of the future on optical waveguide fibers.





Sharing — that simple virtue your mother used to extol - has taken on a whole new dimension in communications.

A nascent communications scheme multitenant shared systems, enables office building tenants to share a range of telecommunications services that they would not be able to afford on their own.

One switching device and wiring net-work is installed in the building, and this system is shared by the building tenants on a pro rata expense basis. Along with inexpensive access to long-distance and local telephone lines, tenants are offered a cornucopia of optional communica-tions services, including voice messaging, mes-sage centers, detailed call accounting, shared data processing, word processing and data communications. Tenants can opt for any combination of the services or none at all.

The shared services market is blossoming, according to Jerry Lucas, president of Telestrategies, Inc., a McLean, Va.-based research firm. At a meeting on multitenant shared services, Lucas claimed that 18 million square feet of office space were equipped for shared services in 1983, bringing in \$135 million for the year. "The market is soaring," Lucas said. He said it can be expected to reach 320 million square feet in 1992 and yield \$10 billion of revenue per year by 1994. Lucas estimated that profits can range from 50 cents to \$1.50 per square foot per year.

According to Gardner McBride, executive vicepresident of Building Owners and Management Asso-ciation, International, Inc. (Boma), the concept of shared systems has been around for many years, but its application is something fairly new. It

Hartigan is managing editor of Computerworld On Communications.

BY PATTI HARTIGAN

brought to the forefront by the deregulation of AT&T. "In a breakthrough effort a few years ago, one of Boma's members in Atlanta applied to put a shared system in his office building. AT&T in New York, from the office of the chairman, denied him that opportunity," McBride explained. "But today, his opportunity is assured because of the settlement between

the Justice Department and AT&T." Multitenant shared systems provide advantages to tenants, owners and developers alike. They:

■ Benefit small to medium-size tenants. The economies of scale gained through sharing in the cost of a switch enable tenants to afford additional services they may not have been able to purchase on their own. And small tenants are guaranteed service. In the past, if a small tenant made a deal

with a larger tenant to take a share of the large tenant's private branch exchange (PBX), the small tenant could have been left with no service or equipment if the large tenant moved out.

■ Account for expansion needs. The whole building is prewired, so it can easily be adapted to handle the

needs of a new tenant or a tenant that is expanding.

• Make buildings attractive. With an excess of 281 million square feet of office space in 1983, building owners must compete for tenants. Multitenant shared systems is another amenity - not unlike air conditioning, heat, carpeting or other attractions - that can make a building attractive to potential tenants.

Several kinds of organizations are popping up to provide services in this growing market. The first to enter the market were independent service organizations that wire a building and offer multitenant shared services to tenants on a concession basis. One such firm is Electronic Office Centers of America, Inc. (EOA), a firm that entered the market three

Shared Services

years ago when it wired the Merchandise Mart and the Apparel Center in Chicago. One of EOA's recent projects is One Financial Place, a 40-story tower in downtown Chicago. The building features EOA's Exchange Information System, known as Excis; Teltrax, an in-house message service for busy or unattended phones; and Score, a system through which users can share software, data base access and pooled word processing. And in a joint venture with United Technologies Corp., EOA is retrofitting several buildings in Dallas for shared services.

Another type of service is the prime tenant offering, in which a large tenant with subsequently large telecommunications needs shares its system with the other tenants in the building. One such setup is Planning Research Corp.

Another type of service is the prime tenant offering, in which a large tenant with subsequently large telecommunications needs shares its system with the other tenants in the building. One such setup is Planning Research Corp. (PRC), a McLean, Va.-based research firm. PRC rents the whole building from the owner and subleases to small tenants on a short-term basis.

(PRC), a McLean, Va.-based research firm. PRC rents the whole building from the owner and subleases to small tenants on a shortterm basis. PRC has a unique arrangement in which it offers shared communications services, an art department, a cafeteria and a slew of other amenities (see sidebar below). In January, over 50 professionals involved in shared systems met at PRC to form a trade organization. According to John Daly, PRC's telecommunications manager, this organization will provide a forum for building owners, tenants, vendors and builders to discuss regulatory issues, tariffs and product and building development. It will also focus on information dissemination and will be a repository of successful systems. The organization's charter is in the process of being drawn up.

tems. The organization's charter is in the process of being drawn up. On the vendor side, the major PBX players include AT&T Information Systems, with its Dimension/System 85; Intecom, Inc., with its IBX; Northern Telecom, Inc., represented by its SL-1; United Technologies Corp., with its Lexar; and Rolm Corp., with its CBX. Intecom has signed a \$100-million purchase agreement to

PRC: Where Sharing is a Way of Life

A man's office is his castle.

Or so it seems at Planning Research Corp. (PRC) in McLean, This ultramodern building does everything but breathe and seems to have everything — including the kitchen sink. Located in the suburbs of Washington, D.C., the building at 1500 Planning Research Drive is a working example of a burgeoning concept in telecommunications - multitenant shared sera consulting, PRC, vices. research, engineering and devel oping firm, moved into the building in July 1981 and sublet extra space to tenants on short-term leases.

The tenants, however, get more than just space. They get the option to share in a full-fledged telecommunications system. PRC obtained a resale common carrier license from the Federal Communications Commission in 1981 and installed a switching and data communications system. PRC offers tenants services ranging from long-distance and local telephone service, a message center designed to eliminate telephone tag, call detail recording and automatic route selection.

PRC offers to finance tenants' equipment, with a purchase/lease agreement spread over five years. After the 60-month period, the tenant has an option to buy the equipment for \$100. In addition, tenants pay for the long-distance network on a pro rata basis. In addition to gaining the con-

In addition to gaining the convenience of a ready-to-use network, tenants realize financial benefits as well. "Because of the economies of scale gained through sharing, tenants can afford additional service they would not be able to afford had they purchased it on their own," John Daly, PRC's telecommunications manager, said.

The network itself is also designed to be cost-effective. It uses a Northern Telecom, Inc. SL-

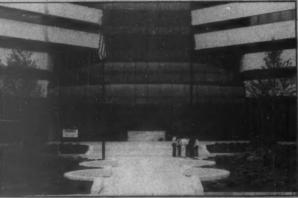


Photo courteey of PRC

Multitenant shared systems thrives at McLean, Va.-based PRC.

1-VLE stored logic, 1,500-line digital switch. It is a baseband building network with six-pair Teflon cable, in which two pair are used for voice and four pair are used for data.

Daly estimated the savings realized from using the baseband network amount to as much as \$300 to \$500 per terminal installed. "We have connected over 500 terminals to our host computers at a cost we would not have enjoyed had we used so-called broadband or wideband networks," Daly said. "And we see no reason for considering the higher speed broadband networks. Most of our terminals are connected on twisted pair and operate at 9,600 bit/sec, which serves our purposes."

What about downtime? "We virtually have no downtime for a number of reasons," Daly said. "The system is fully redundant, and we have a technician on premises full-time. If an element fails, it can be replaced on the spot. And we keep equipment in reserve so that we can substitute an instrument if one fails."

PRC also offers time-sharing services to its tenants. "The poli-

cy and concept of PRC is to share all of the services that are available to PRC users in the building," Daly said. That includes well-pruned jogging trails, sauna, showers and locker facilities, a Marriott-catered cafeteria and executive dining room, an art department, publications department and print shop. It also includes photocopiers equipped with keyboard controls, janitorial services and use of the in-house library.

All this — and nary a wire is seen. In fact, all telephone wiring is hidden in the walls, so as not to muss up the external appearance of the technologically sound building. The building sports a nouvelle cuisine-like look — shades of mauve and muted gray abound on walls dotted with abstract art. And the desks seem to be self-cleaning: Papers are not randomly scattered all over.

All of this is kept firmly secure with PRC's extensive security system. "Every door to access every wing is controlled by an electronic key system," Daly explained. "Only personnel that have a right to enter a certain area can do so because of the control exercized.

"We all use a slate access card with a circuit embedded in it. That circuit generates a frequency when it is activated by a sensitive mechanism." he maintained

tive mechanism," he maintained.
Only one tenant, International
Data Corp. (IDC), a research firm
with headquarters in Framingham, Mass., does not share in the
system. "The only reason we
don't participate is that we were
the first tenant in the building,
and the system wasn't working
when we moved in," George DiSalvo, a spokesman for IDC, said.
IDC purchased its own equipment before PRC offered the
shared services. "I think it would
help us if we had it. We just had
to add a line, and it is a lot of hassle to deal with the phone company," DiSalvo said.

Another tenant, Gaspar Martinez-Johnson, corporate vicepresident of Columbia Group Associates, Inc., extolled the
benefits of the shared system.
"We are a company of under 30
people. I wouldn't have the time
to try to manage telephone and
computer communications. I'm
in a situation where all I have to
do is ask for what I need, and
they do it for me," he said.

The key factor, according to Martinez-Johnson, is that all services are at his fingertips. "It ranges from true computer communications right down to janitorial services, which we seem to take for granted. But in between, everything gets done."

werything gets done."

Martinez-Johnson would like to take the concept of shared services a step further into total facilities management. "Picture an office building, really a condominium. You have one source for everything: an art department, xeroxing, the mail, your phones, computer environment, telecommunications in-house services, microcomputer networks — it would be an excellent idea.

"And sooner or later, someone will get smart to it," he said. Perhaps someone already has.

provide its IBX to Isacomm, a subsidiary of United Telecommunications, Inc. Intecom's switch is currently used in multitenant systems at the Chicago Board of Trade and the Galleria Office Tower in Dallas. The IBX has software to support up to 1,000 tenants and has a universal wiring plan for both voice and data so separate cabling is not required. PRC uses Northern Telecom's SL-1-VLE.

"I believe we have to keep the [Bell operating companies] in place: I fear their diminishment. I'd like to see them enhance their capability by offering more services, by competing with bypass technology," Daly said.

long-distance, you've got essentially what you had before deregulation,"

Bishop explained.
"You go through all this trouble and cost, millions

and millions of dollars of expenses, and then you let AT&T Information Systems provide long-distance services — you might have just as well stayed where you were in the beginning," Bishop maintained.

Victor Toth, a Reston, Va.-based lawyer who specializes in communications, explained: "The customers would just as easily be served if AT&T would simply be satisifed with providing the equipment, leaving the other partner in the venture to take the

ND JUST where do the Bell operating companies fit into this scenario? As yet, none of the operating compa-nies have entered the market, but will probably make a move toward it in the near future. Daly said he has no qualms about the operating companies entering the mar-ket. "I personally believe we have to keep the [Bell operating companies] of the world in place: I fear their diminishment. I'd like to see them enhance their capability by offering more services, by compet-ing with bypass technol-

ogy," he explained.

Bishop, however, disagreed. "If it made sense to separate the services with the divestiture, why are we trying to bring them back together again? It just doesn't make sense to let each individual company start to emerge and bring the various services — long-distance, local and so on — back together."

so on — back together."
A similar argument has arisen over plans for a joint venture announced in February by United Technologies and AT&T Information Systems, AT&T's unregulated subsidiary. Under the venture, the participants would contract with landlords to provide shared multitenant services. However, the Federal Communications Commission (FCC) Computer II decision prevents AT&T Information Systems from reselling most private line, or basic, services. AT&T Information Systems has filed a petition asking the FCC to waive that part of Computer II in order for the joint venture to proceed.

Although an AT&T In-

formation Systems spokesman declined comment on the petition, representatives of independent service providers were quite vocal about it. "Once you allow AT&T Information Systems to get involved in Front-end back-up switching?



It's a jungle out there.

If you need back-up switching and if your tech control looks like a jungle of patch cords, cables, and switches, you need the Bytex AUTOSWITCH Electronic Matrix Switch. Using a familiar CRT console (optional color) and simple English language inputs, you can switch hundreds of lines—in seconds—with a single command using logical group names. AUTOSWITCH integrates EIA RS232, V.35, four wire analog, and current loop interface port cards into one common switching matrix which can grow modularly up to

3840 ports. Multiple monitoring ports are available for all interface types to help provide quick and efficient network diagnostics.

Bytex, with over 300 AUTOSWITCH units installed with some of the world's largest and most prestigious users, is a technology leader in electronic matrix switching. So break out and join those satisfied users who are experiencing fast and effective network restoral with the Bytex AUTOSWITCH, the Automatic choice. Write or call for your Bytex guide out of the tech control jungle.

Bytex Corporation, 2 California Ave., Framingham, MA 01701 (617) 879-5050 Telex 951151 Call Toll Free: 1-800-227-1145

Bytex

Shared Services

responsibility for the long-distance portion.

At press time, the petition was pending before the FCC. "I think AT&T will be turned down," Toth maintained. And Bishop declared, "If you ask me, frankly, I think they will not be allowed to do it." The AT&T spokesman declined comment.

HE PROPOSED AT&T-United Technologies joint venture brings up the question of credibility. Some say such a venture would add credibility to the nascent market, adding established names and a supplier with hefty resources. According to the AT&T spokesman, the joint venture would "stimulate the market-

place."

McBride agreed that the venture would add credibility to the market. "It's a question of the long-term staying power of the people that are involved,"

McBride said. "Of those that have approached the industry, we've seen a number of them that come in with apparent plans to move forward very strongly — and then they back off substantially," he ex-

"One of the few that has been in on a steady basis is United Technologies, and they've cer-tainly enhanced the credibility of the industry," McBride pointed

But, Toth pointed out, "AT&T has had its eye on this market for 10 years. They have considered its potential as far back as the 1970 Bell President's Conference in Key Largo, Fla., but apparently de-liberately avoided promoting it so as to maximize their opportunity in individual customer premises equipment sales.

But now that they see the market is growing, they need to promote multitenant systems in order to open markets for large systems. It is a credible concept, and I feel that AT&T Information Systems' entry only has the potential for competitive destruction. The destructive competitive impact would more than offset the credibility gained."

UST HOW VIABLE IS the market? According to Boma's McBride, the verdict on that question will not be in for several years, due to the nature of the real estate market. "I don't think anybody has a track record of more than maybe a couple of years," he said. "We certainly don't have enough buildings using shared systems to get widespread acceptance of how much this can or cannot do for a build-

"Remember, we are talking about buildings that last as long as 20 to 100 years, and in consequence, people look at decisions over a much longer framework of

Just bow viable is the market? According to McBride, the verdict on that question will not be in for several years, due to the nature of the real estate market. "I don't think anybody has a track record of more than maybe a couple of years," be said. "We certainly don't bave enough buildings using sbared systems to get widespread acceptance of bow much this can or cannot do for a building."

time," McBride explained.

There isn't even a consensus on how many existing buildings are

wired for shared tenant services Lucas claimed there are over 60 such buildings in the country. Daly however, claimed that there are "eight working systems," although he has heard claims of some 55 or 60 systems.

In addition, Laura Leach of AT&T Information Systems' Shared Systems Group claimed that her group has contracts or has sold shared systems in "50 or 60 or 70 buildings."
But, she added, "I'd say we

have over eight or nine or 10 actu-ally installed."

McBride added yet another fig-ure to the list. "To my knowledge, there are not more than 60 buildings in the country that are actively committed to the purchase and installation of a PBX on a shared tenant basis, although nearly ev-eryone is thinking about the pos-sibility. There are probably no

Mom Knows

When it comes to efficient communications

ware and software to turn your IBM PCs,™ DEC Rainbows,™ Apple Lisas,™ and other micros—as well as terminals - into full-function work stations. Instantly

MOM, which stands for Marketing of Micros to Mainframes, specializes in distributing sophisticated, stateof-the-art interface equipment. You can depend on her to link your micros to host computers quickly. Efficiently Problem-free.

MOM's old fashioned when it comes to product reliability, service and support. Her advice is sound. Trust & her MOM suggests only those products that will provide you with the solutions you need. Tell her what your needs are, MOM will tell you the best way to increase productivity as well as keeping costs down.

MOM knows the value of a

Money doesn't grow on trees. So solutions to today's business communication problems need to be



compatible with the next generation of technology MOM stretches your computer investment dollars by adding processing capabilities to town or around the world. IRMALINE microcomputers and terminals, connects you direct to your main-

MOM can fix you up with the hard- eliminating the need for additional expensive hardware. Data control is centralized in the mainframe.

Meet a few of MOM's family.

MOM markets a growing number of very impressive hardware and software products. Each one is compatible with a variety of microcomputers.

Meet IRMA.™

IRMA goes with CHARLIE, the IBM PC or XT.™ IRMA is a Decision Support Interface™—a printed circuit board

that slips into the PC and provides a direct link to the IBM mainframe computer IRMA provides full 3278 emulation. She puts you on line with the mainframe-via a coax cable—giving you instant access to the big computer, the prime source of current data.

And then, of course, there's sweet IRMALINE.™

IRMA's sister, IRMALINE, links personal computers - no matter how remote - to IBM 3270 networks. And like her sister, IRMALINE is a Decision Support Interface. She lets you conduct 2-way phone communication with your mainframe via a 3270 terminal, from across frame with a local phone call rather than having to dial long distance. So you save money!



Team IRMALINE with IRMALETTE™ -another member of MOM's family-to get the same data capture functions IRMA provides.

PC/COM.™ The perfect mate for IRMA.

This software system works in conjunction with IRMA to provide high speed transfer of files between the mainframe and the IBM PC or XT. PC/COM's universal file transfer capability is compatible with major IBM operating systems and associated application files. Single function keys provide users with easy-to-use menus to transfer text files, source programs, data and object files between the mainframe and the personal computer

Users are subject to centralized mainframe control, so security is much tighter. MOM believes in keeping a tight lip.

AVATAR.™ MOM'S UNIVERSAL TERMINAL CONVERTER.

AVATAR is MOM's self-contained microprocessor system that converts a terminal into a full-function, standalone personal computer All it takes is a simple cable connection between

Shared Services

more than 25 or 30 that are actually working," he said.

McBride pointed out, however,

that there is a rising tide of interest in shared systems, and Boma is putting on a series of seminars this month to address the potential benefits and problems of shared systems.

ND THERE ARE problems. "I can tell you from talking with some of Boma's members, not all of the systems installed are working well, McBride said. Al-though McBride declined to name which ventures have had difficul-

"The older building is the one that probably has a bigger need for this service than anybody, because the competition is the guy with the glass and steel building next door, and be is stuck with a building that is 10 or 15 years old," Bisbop explained. "What does be bave to sell? He needs this enhancement probably more than anybody to maintain bis position."

MOM, PC/COM and PATCHES are trademarks of National Product Marketing, Inc. ©1983, The MOM Corporation

ty, he maintained that a number of projects have had a variety of problems: problems with the vendors, problems getting the tenants to subscribe to the service and misjudgments on how many tenants would subscribe. "I talked to them, and I tell you that some of my members wish they hadn't done it.

"On the other side of the coin," he continued, "there are some that are very pleased with it — who see problems associated with it — but think that the problems could be ironed out in the long

These problems include the fact that many potential tenants, particularly the large tenants, already have their own telecommunications strategy. There is also the question of business interruption liability. Providers of shared services, McBride said, are concerned that they may be liable if the tenant's system goes down.

Providers are also concerned out obsolescence, McBride about said. After the network is installed, there is a good chance that it will have to be upgraded for one reason or another

In addition, McBride pointed out that some of the PBX manufacturers are identifying the small tenant as a target of opportunity. "It is going to be increasingly tougher to sell shared services when the manufacturers of the electronics are attempting to make it more attractive for the individual or the small tenant to own their own system," he explained.

The problem with tenants es-tablishing their own telecommunications strategy is inherent in the case of existing buildings. According to McBride, in order to retrofit a building for shared services, usually a major block of space must be vacated that the service organization can work with and try to make the building more attractive.

"I know of very few that are going into a building that is already full and where all the tenants are committed to their telecommunications schemes," McBride pointed out.

HICAGO'S MERchandise Mart, retrofitted by EOA, is an exception. And accord-ing to Bishop, half of EOA's projects are in existing buildings.
"The older building is the one that probably has a bigger need for this service than anybody, because the competition is the guy with the glass and steel building next door, and he is stuck with a building that is 10 or 15 years old. What does he have to sell? He needs this enhancement probably more than anybody to maintain his position.'

Another problem that must be addressed is system maintenance A facilities manager is generally necessary to manage and maintain such a large system, and mainte-nance schemes vary. The building owner can hire his own staff to provide maintenance, but this scheme is more likely when the owner himself is a major portion of the tenancy.

In most cases, independent

from micros to mainframe-MOM does it all.

the terminal and the host system. No terminal modification is required. You get PC power on the terminal in addition to your normal terminal capability

In addition, AVATAR is portable, so it's very easy and efficient to use. Buy AVATAR, and MOM will give you CP/M,[®] MS-DOS,[™] WordStar,[™] CalcStar,[™] and CBASIC,[™] software. Absolutely free! File transfer software The PC Traveler™ is a full-function is available as an optional feature.



AVATAR PA1000: Another way to talk to any computer.

The PA1000 protocol converter allows you to connect any asynchronous terminal or PC into an IBM 3270 network and simultaneously into any asynchronous host system. You can do it from either a local or a remote location. The PA1000 has additional ports to which you can attach a printer



MOM even has a computer.

This small, professional computer in a briefcase caught MOM's eye.



IBM-compatible, portable computer A 28-pound wonder, it comes standard with a gas plasma display for 25 lines/80 characters, 128k RAM memory and an IBM PC-type removable keyboard. The dot matrix impact printer is bi-directional. 132 char-compressed.

The PC Traveler has graphics capability and communication options (300/1200 BPS internal modem). The 8 meg floppy disk is upgradable to 16 megs. The computer uses 16 bit, dual 80186 processors and is 10 times faster than the IBM PC.

Available for delivery, Jan., 1984.

MOM and PATCHES.™

Anything worth preserving is worth protecting, so MOM developed PATCHES. A patented chip protection

system insures the integrity of her software. This system allows users to copy MOM's software for their internal use, while a companion chip installed in the PC prevents unauthorized use. PATCHES makes and keeps software and communications private and secure.



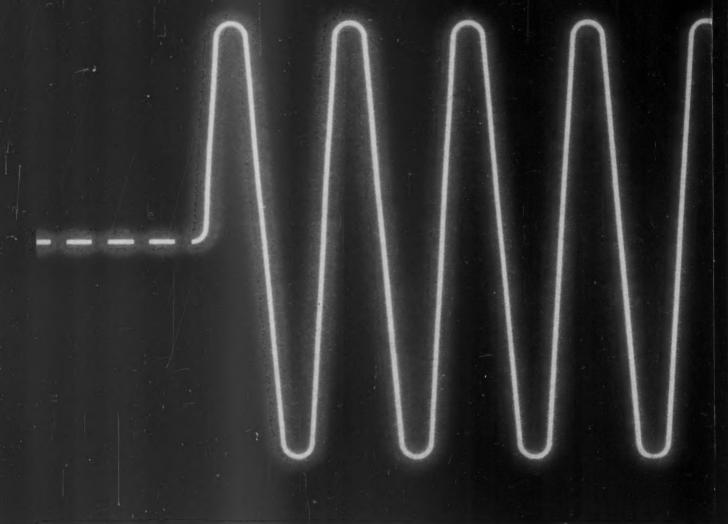
Call MOM. 1-800-241-1170.

MOM knows what's best when it. comes to micro-to-mainframe access. She's made it her business to know the market. Just ask her about products. Bring your problems to her. Trust her for the best advice. MOM knows how to improve your communications network, and nobody is as cost and quality conscious as

MOM is Marketing of Micros to Mainframes. Call her at 1-800-241-1170 or 404/351-2902.

Specialists in Marketing of Micros to Mainframes. Two Northside 75, Atlanta, Georgia 30318 Adivision of NPM, Inc.

THE AT&T FAMILY OF DATAPHONE





You need to move more data than ever before. And it has to move fast.

AT&T Information Systems can help. We have a full line of modems and advanced diagnostic systems—all designed to keep your data coming loud and clear.

A full line of fast-talking modems.

Whether you need to transmit data over private or switched lines, AT&T Information Systems has a modem to make waves.

We offer a full line of asynchronous and synchronous modems—suitable for either multi-point or point-to-point connections—that get data moving at speeds ranging from 300 to 9600 bps.

We keep an eye out for trouble.

You need more efficient, reliable network management. Our DATAPHONE'II Service meets that important need.

It combines synchronous analog data transmission at speeds of 2400 to 9600 bps with a network

diagnostic system on four levels.

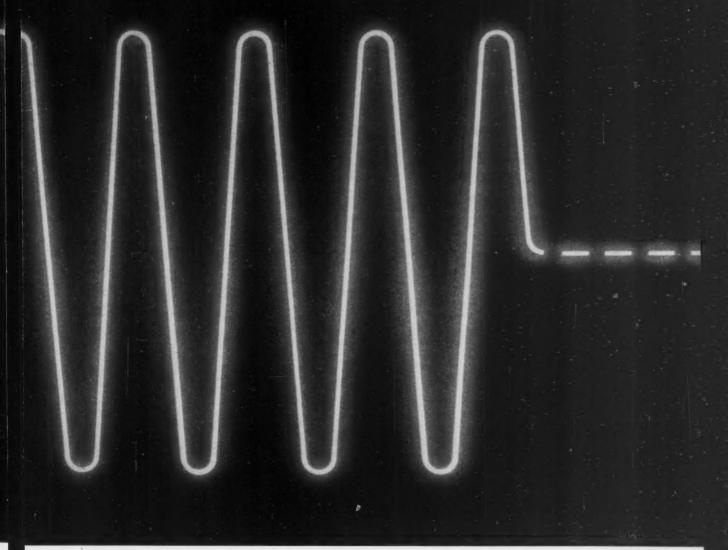
As your system grows, you can upgrade by adding new equipment to monitor and control the data sets you already have.

On all levels of our service, diagnostics are separated from your host computer. You save costly processing time. System malfunctions are detected automatically, isolated and repaired without disabling your network.

Level I utilizes stand-alone data sets with enhanced operational and built-in diagnostic features. It monitors the signal on a low end frequency band to guarantee the integrity of data.

Level II offers more advanced diagnostics for small- to medium-sized networks. A Diagnostic Controller is added to centralize network control and testing. Up to 256 control modems can be

MODEMS. WE MAKE WAVES.



monitored through this single desk-top console.

Level III incorporates the Diagnostic Controller, and adds a Network Controller and CRT for expanded diagnostics and control. Adding a printer provides hard-copy reports of faults and test results. DATAPHONE II Service Level IV is our new-

DATAPHONE II Service Level IV is our newest offering, with eight times the capacity of Level III. Its design and functionality are suited to the largest, most complex networks.

A System Controller manages eight systems, each with four-tier addressing and real-time monitoring. A color CRT provides graphic display of reports. Trends can be analyzed quickly, adjustments made and future problems avoided.

A unique benefit available with DATAPHONE II Service is remote 24-hour monitoring at one of our nearby AT&T Data Maintenance and

Operations Control Centers.

We bring you outstanding credentials.

AT&T led the communications revolution over 100 years ago. Our products set the standards for performance and reliability.

Today, we're applying our resources to provide a growing line of data transmission products. Products developed through the research of AT&T Bell Laboratories, and supported by the largest, most experienced sales and service force in the industry.

Our DATAPHONE products incorporate Information Systems Architecture, the design principle that integrates our products so they perform as one system. As you grow, the flexibility of Information Systems Architecture allows for easy system expansion.

To learn how our family of DATAPHONE Modems can increase your profits and productivity, call 1-800-247-1212, Ext. 328.

WHEN YOU'VE GOT TO BE RIGHT.



Shared Services

organizations arise to provide mainte-nance and management of the system. The Shared Systems Group at AT&T Information Systems is currently running a trial project in shared communications management in four areas around the country.

According to Leach, af-ter the switch is sold to a developer, her group acts as an agent for the developer in managing the

According to Daly, every access point to the system at PRC is under lock and key. "We don't permit AT&T installers access to the switch room until they sign in and provide credentials that prove that they are who they say they are."

switch. "The tenant calls us with any problem or concern he has with the

system. This can range from 'My phone doesn't work' or 'I want to move my phone' or 'I don't un-derstand this particular derstand this particular charge in my bill," AT&T

Information Systems' Leach explained.

> T&T INFORmation distems patches the proper person or organization responsible for solving tenant prob-venture is a

lems. This management function and does not involve providing basic services to end tenants as does the proposed Information tems-United Technologies

venture.

System security is an-other concern, but one that seems readily solvable. Some proponents of shared services claim that shared tenant systems are potentially more secure than stand-alone systems. because one entity has control over all of the cabling closets in a building.

According to Daly, every access point to the sys-tem at PRC is under lock and key. "We don't permit AT&T installers access to the switch room until they sign in and provide cre-dentials that prove that they are who they say they

In addition, all billing is done by PRC and recorded on magnetic tape. Access to that tape is restricted to one person.

LEARLY, THE concept of shared services aims to simplify things for the tenant one bill, one place to call when things go wrong. It is a step in the direction of the much-talked about intelligent building of the future, a building in which everything is taken care of for the tenant, from tele-phone service, to data communications to the temperature of the air to janitorial services.

"Whether or not such a building is technologically possible is an open ques-tion," McBride said. "But I think tenants are looking for buildings that require none or little of their at-

tention.

"I think most people renting space would say, 'I don't want my employees worrying about whether or not the telephone is going to work. I want them paying attention to what I hired them to do: which is not managing the communications system, but managing our business."

SUPERDUPLEX

ERROR FREE 2400RPS FULL DUPLEX AUTODIALING WITH STATISTICAL MULTIPLEXING IS HERE!

Now, from the company that made 2400bps full duplex dial line communications practical, comes the CDS 224° Superduplex . . . the first 2400bps full duplex dial modern with statistical multiplexing, intelligent autodialing, and powerful ARQ error correction in one high performance package. Built on the field-proven design of the microprocessordriven CDS 224 modem.

Superduplex takes dial line data



the CDS 224° Superduplex makes any

communications to a new level of performance, while cutting costs like never before

The CDS 224 Superduplex modem's three port statistical multiplexer eliminates transmission errors and keeps costs low by allowing multiple asynchronous terminals to share a single dial telephone line. Data compression and adaptive priority setting techniques maximize throughput while ensuring that interactive traffic takes precedence over batch. Sophisticated ARQ error correcting power makes Superduplex the only dial line modem that will guarantee your data error free at speeds of 2400bps full duplex.

The CDS 224 Superduplex modem combines next generation technology with user-friendly engineering. Keyboard commands allow you to configure individual ports for character format, flow control and DTE speeds of 50 to 9600bps. Or you can use the modem's autobaud feature which automatically adapts the speed of the multiplexer to match your DTE.

The CDS 224 Superduplex autodialer places and redials any access or telephone number using interactive keyboard instructions or software commands. Compatible with any personal computer, minicomputer, mainframe system and all long distance telephone services, the CDS 224 Superduplex modern lets your terminals transmit data unattended so you can take advantage of lower rates during off-peak telephone hours

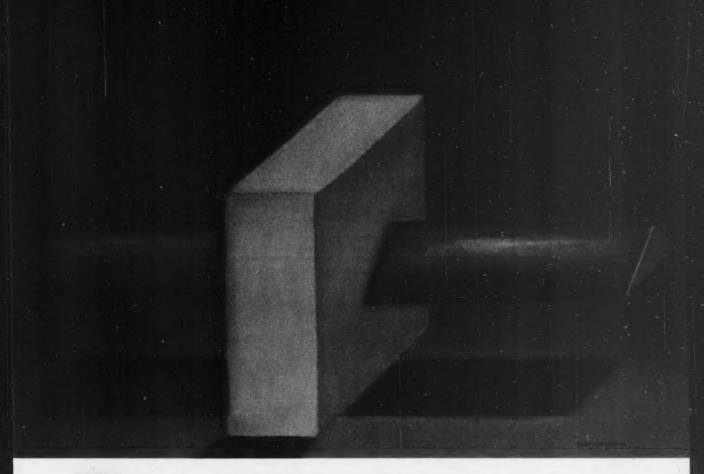
Like all CDS 224 modems, the CDS 224 Superduplex operates at 2400bps with Bell 212A compatible fallback. It fully complies with CCITT recommendations and supports HDLC, SDLC, X.25 and all other communications protocols.

So why pay for costly leased line data communications when the CDS 224 Superduplex modem gives you three port multiplexing, autodialing convenience and error free 2400bps full duplex transmission on one lowcost telephone line.

To order your Superduplex modem call or write Concord Data Systems. 303 Bear Hill Road, Waltham, MA 02154, (617) 890-1394, Telex: 95-1793 or contact us for the name of your nearest CDS distributor today.



CONCORD DATA SYSTEMS LINKING COMMUNICATIONS TECHNOLOGIES



rotocol conversion is one of today's hottest topics, particularly when you consider its application to the problem of micro-to-mainframe communications links. Despite the fact that the industry has been around since the late '70s and has an installed base of al-

most \$500 million, it was not until the advent of the IBM Personal Computer that the protocol converter market really exploded. IBM has already shipped over 500,000 Personal Computers and expects to deliver twice as many in the next year.

This incredible penetration of Personal Computers in the corporate environment and the resulting requirement to integrate them with existing electronic data processing systems has created a dramatic increase in the demand for protocol converters. Projections show that the market for hardware and software protocol converters for 1984 will be equal to the currently installed base of \$500 million.

Naturally, this has prompted a corresponding increase in the number of

suppliers and products available to users. If protocol conversion is defined as the ability to make Ascii terminals and micros function effectively in an IBM 3270 environment, there are well over 50 suppliers, and the list is still growing. However, the basic approaches to protocol conversion in general use can be limited to three categories:

 Hardware protocol converter boxes.
 Add-on boards for the IBM Personal Computer.

Mainframe-resident software for protocol conversion.

Hardware protocol converter boxes have been the traditional protocol converter — a black box that appears to the host as an IBM 3270-family

cluster controller on a Binary Synchronous Communications or Systems Network Architecture/Synchronous Data Link Control (SNA/SDLC) line. The user connects his Ascii devices to the box directly or via dial-up lines with the number of ports on the converter varying and depending on the make and model. Renex Corp., PCI Systems, Inc., Datastream Communications, Inc., Local Data Co. and Comtex Scientific Corp. are only a few of the leading suppliers of this type of device.

In addition to offering 3270 support for the Personal Computer and a variety of popular Ascii terminals, these devices provide remote access and have virtually eliminated the need

PROTOCOL BY TONY CONVERSION

Katz is general sales manager, Simware, Inc., Ottawa, Ont., Canada.

Protocol Conversion

for more than one terminal on a desk. For about \$1,000 per terminal supported, they are a cost-effective alternative to IBM 3270s.

A more expensive variation is IBM's Series/1 with the Yale University Installed User Program or the recently announced 4994 (a scaled-down Series/1 for 4300based VM users), which attaches directly to a channel. While the channel-attach feature is attractive, the extra cost and the inability of the Series/1 to be located remotely limit this system for some

The major liability of most protocol converter boxes is the relative inflexibility of hardware in such a rapidly changing environment. There is limited room for growth, and it may be impossible

to update the hardware to add necessary or desirable new features. This may force the user to replace outdated equipment.

HERE ARE TWO DIStinct types of add-on boards for the IBM Personal Computer. The first converts a Personal Computer into a 3278 terminal that plugs directly into a 3270-family control-ler via coaxial cable. Communications Digital Asso ciates, Inc.'s Irma and CXI, Inc.'s Pcox board are two examples. For a cost of about \$1,000 per Personal Computer, this is an attractive alternative if you already have a 3270-family controller with a spare coaxial jack within convenient cabling distance. If you do not have a local 3270 controller, the cost of installing one or running coaxial cable to a distant controller is prohibitive.

The second type of add-on board, such as Techland's Blue Lynx or the IBM SNA 3270 board, make the Personal Computer function as a 3278 terminal with a

built-in 3276 controller. This is an expensive proposition unless you can easily multidrop several Personal Computers on one commu-nications line.

In any case, only the IBM Personal Computer and board-compatible micros can be supported in this manner. If there is a requirement to support Ascii CRT terminals or other micros, then alternative approaches must be examined.

In addition to these hardware approaches to protocol conversion, software is the other major sion, software is the other major method in use today. In early 1982, Simware, Inc. introduced SIM3278, the first generalized mainframe-based software proto-col conversion package. Currently installed at several hundred sites, this software package can support almost any Ascii CRT or micro as a simulated 3270 under VM or MVS/Vtam.

Since a single copy of the soft-ware can effectively support hun-dreds of users, this can often be the most cost-effective solution. For example, based on the cost of SIM3278, you can support 32 si-multaneous users for as little as \$250 each.

IBM, through its PVM 3101 system, and Amdahl Corp., with its Session program, also offer soft-ware to support Ascii CRT as sim-ulated 3270s, but only under VM. The IBM product is further limited in that it will only support the IBM 3101 CRT.

The chief drawback to software protocol conversion is that it is currently available only under the VM or MVS/Vtam operating systems. Its major advantage is its ability to grow by adding addi-tional users and new features without a significant increase in cost

In the last year, almost every major software vendor has jumped the bandwagon and nounced products to provide support for micro-to-mainframe com-munications. Unfortunately, there have been more announcements than deliveries. For the most part, these offerings seem to be directed in support of the vendors exist-ing maintrame software products or to open new markets in the mi-cro field, rather than to provide a generalized all-purpose micro-tomainframe communications link.

ROTOCOL CONVERsion is also becoming an integral part of the communicalarger tions environment. Proof of this is demonstrated by the recent announcements such telecommunications industry giants as Northern Telecom, Inc. and Rolm Corp. Their new generation of voice-data private branch exchanges incorporate protocol conversion. Other industries currently examining the feasibility of incorporating protocol conver-sion into their products or service include several value-added communications network carriers and front-end processor manufacturers

As the competition in the proto-col conversion market intensifies and as other technological developments impact the communications field, a new trend is rapidly becoming apparent: Protocol conversion alone is insufficient in many cases. Vendors must be able to deliver additional features that



Remote Switching

When you choose the IBXTM Integrated Business Exchange from InteCom, you get some major advantages. Like remote switching capabilities. And a tremendous untapped potential for growth. Plus all the benefits of a time-tested system.

The IBX is the first fully integrated, absolutely non-blocking, digital voice/data switching system in the world. It's already operating in companies all across the United States. And it's ready to link your multi-vendor systems and equipment into one efficient communications package. Through its unique architecture and a host of advanced

Specially designed to expand its sophisti-cated capabilities to smaller, distant sites, the IBX network can tie together campus-type facilities, or link company locations in different cities. It's an economical alternative to a standalone switch in every location. Offering savings in operating costs and personnel due to centralized control and administration. Yet, as growth demands, a remote portion of the switch can be easily upgraded to a full IBX.

to a full IBX.

The IBX design also offers you the versatility of format and protocol conversion with InteNet™ Packet Controllers. Wideband LANmark™ local area networking for superspeed packet switching. Shared tenant services. And convenient voice messaging with InteMailSM. For cost efficiency the system uses two-pair ciency the system uses two-pair.

resources for ciency, the system uses two-pair wiring and modern fiber optics. Designed for up to 12,000 lines, the IBX switch can start as small as 250 lines. And it's already prepared

to incorporate new applications, keeping pace with the industry and meeting your needs for years to come.

The IBX communications system from InteCom. It's the indispensable business tool for the 80's and beyond, from the innovative leader in office technology. For complete details on an IBX investment, write or call: 1-800-INTE-800. In Texas, call 1-214-727-9141.

Integrating Communications

tomorrow.

601 InteCom Drive • Allen, Texas 75002 • 214/727-9141

IBX, InteNet and LANmark are trademarks and InteMail a service mark of InteCom Inc.

Continue to receive



every month!

168



the monthly news magazine devoted to the broadest coverage of the fastchanging world of communications will soon be available only to a limit-

ed number of qualified communications professionals.

On Communications is specifically for communications professionals, whether your interest is technical, commercial, service or consumer-oriented. Straightforward and easy-to-read, On Communications offers fresh perspectives, provocative articles and interviews that keep you on top of what's happening in your areas of interest.

To continue to receive Computerworld On Communications, just complete the attached FREE Subscription Request Form. Your complimentary subscription will continue to be FREE, but only if you let us know that you are a qualified subscriber. Simply indicate your areas of interest and involvement in communications, sign and date the form and drop it in the mail. We pay the postage.

Don't miss a single issue of the publication that keeps you on top of an industry in the midst of unprecedented change! Send in the attached form today!

FREE SUBSCRIPTION REQUEST FORM	First Middle Last Initial Name
Free subscriptions will be accepted only from individuals in the U.S.	Your Title
and Canada with active professional or managerial responsibilities in	Company Name
communications. Publisher reserves the right to limit the number of free subscriptions accepted in any business category. To qualify, you	Address
must answer all of the questions below completely, sign and date this form. Then just drop the card in the mail; no postage necessary.	City State Zip Code
I wish to receive a free subscription to	Address shown is: Business Home
On Communications Yes No Signature Date Send foreign rates. IMPORTANT Please indicate your communications and industry involvement by circling the appropriate choices for each section. HOW TO GET YOUR FREE SUBSCRIPTION: A. Fill in your name and address. B. Circle information at right. Don't forget to sign your name and date. C. Return card today to start your FREE subscription to Computerworld On Communications.	III. Which of the following best describes year indisstry? (circle one only) 1. Manufacturer (other than computer/ communications) 2. Finance/Insurance/Real Estate 30. Medicine/Law/Education 40. Wholesale/Retail Trade 50. Business/Computer Services 60. Government - State/Federal/Local 65. Public Utility/Communication System/ Transportation 70. Mining/Construction/Petroleum/Ref. 75. Apriculture/Foresty 80. Manufacturer Computer/Comm. Equipment 95. Other (please specify) 10. Corporate Management, Planning, Development 20. Communication System Management Planning, Development 20. Communication System Management Planning, Development 20. Communication System Management, Planning, Development 20. Communication System Management Planning, Development 21. Which best fellowing best describes year jeb trocked provided including and industries and businesses) 22. Communication reduction systems and equipment (including all industries and businesses) 23. Government - Federal/State/Local (including military) 24. Interconnect (including manufacturer, contractor, wholesaler or other vendor) 25. Systems Integrators, Systems and Software Houses, Service Bureaus and Consultants 26. Planning Service (including and industries and businesses) 27. Interconnect (including an industries and businesses) 28. Government - Federal/State/Local (including an industries an
FREE SUBSCRIPTION REQUEST FORM	First Middle Last Indial Name
	Your Title
Free subscriptions will be accepted only from individuals in the U.S. and Canada with active professional or managerial responsibilities in communications. Publisher reserves the right to limit the number of free subscriptions accepted in any business category. To qualify, you must answer all of the questions below completely, sign and date this form. Then just drop the card in the mail; no postage necessary.	Company Name Address State Code Code
I wish to receive a free subscription to	Address shown is: Business Home
On Communications Yes No Signature Date Send foreign rates. IMPORTANT Please indicate your communications and industry involvement by circling the appropriate choices for each section. HOW TO GET YOUR FREE SUBSCRIPTION: A. Fill in your name and address. B. Circle information at right. Don't forget to sign your name and date. C. Return card today to start your FREE subscription to Computerworld On Communications.	1. Which of the following best describes your industry? (circle eas early) 10. Manufacturer (other than computer/ communications) 20. Finance/Insurance/Real Estate 30. Medicine/Law/Education 40. Wholesale/Retail Trade 50. Business/Computer Services 60. Government - State/Federal/Local 65. Public Utility/Communication System/ Transportation 70. Mining/Construction/Petroleum/Ref. 75. Agriculture/Forestry 80. Manufacturer Computer/Comm. Equipment 95. Other (please specify) 10. Corporate Management, Planning, Development 20. Communication System Management, Planning, Development 21. Communication System Management, Planning, Development 22. Communication System Management, Planning, Development 23. Communication System Implementation & Operation 40. Other (please specify) 40. Other (please specify) 41. Which sat describes your communication systems and equipment buying respeasability? (circle ose only) 42. Specify D. Approve Purchase 43. Recommend E. None 44. Under 500 45. Specify D. Approve Purchase 46. Public difficult of the fallowing best describes your organization, situation systems and equipment (including industries and businesses) 46. Commercial or institutional end user of comiciation systems and equipment (including industries and businesses) 46. Commercial or institutional end user of comiciation systems and equipment (including industries and businesses) 47. Commercial or institutional end user of comiciation systems and equipment (including industries and businesses) 48. Government - Federal/State/Local (including military) 49. Commercial or institutional end user of comiciation systems and equipment (including industries and businesses) 40. Commercial or institutional end user of comiciation systems and equipment (including and industries and businesses) 40. Commercial or institutional end user of commenciation systems and equipment (including industries and businesses) 42. Commercial or institutional end user of commenciation systems and equipment (including industri



FREE To Qualified Subscribers.

Send in Your Card, Today!



BUSINESS REPLY MAIL FIRST CLASS PERMIT NO. 866 FRAMINGHAM, MA 01701

Postage will be paid by addressee

COMPUTERWORLD ON COMMUNICATIONS

375 Cochituate Road Box 897 Framingham, Mass. 01701

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES



BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 866 FRAMINGHAM, MA 01701

Postage will be paid by addressee

COMPUTERWORLD ON COMMUNICATIONS

375 Cochituate Road Box 897 Framingham, Mass. 01701 NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES



provide Ascii CRT Personal Computers and 3270 users with ex-tended capabilities in an enhanced terminal environment.

This trend is another direct result of the impact that the Personal Computer is making on the protocol converter market. An example of this trend can be found in the results of a recent survey of protocol converter users and those actively evaluating

The vast majority of respondents indicated that interactive file transfer for the Personal Computer — upload and download with on-line error detection and correction - must be available for any protocol converter that they acquire. Since the IBM Personal Computer is the most rapidly expanding market for protocol converters, any product that hopes to survive must satisfy this minimum expectation.

In response to these demands, the more innovative suppliers are introducing new features to satisfy requirements that are not being met today. IBM, which has always been quick to capitalize on emerging trends, endorsed this concept with the announcement of both the 3270 Personal Computer and the XT370. Not only do these units function in the 3270 environment, they also feature many extended capabilities. The 3270 Personal Computer provides multiple concurrent sessions and windowing, while the XT370 adds VM/CMS.

Several other suppliers have be-gun to provide additional capabilities. Amdahl recently announced a product called Session. Al-though limited to VM, it provides both protocol conversion and session management. PCI Systems,

Inc. has announced a dial-out facility to allow 3270s to access non-IBM systems. Renex's protocol converter includes compare code, feature that can increase throughput and lower communications costs by reducing the amount of data sent to the screen. Comtex now offers a local pro-cessing capability for Ascii CRTs in addition to protocol conver-

While there may always be a place for the basic protocol converter, there is every indication that the lion's share of the market will go to those that can provide users with an enhanced terminal environment.

The key to providing these ca-pabilites is software, whether on the mainframe, the micro, in a box or on a board. Only software has the flexibility to adapt to the everchanging demands of the marketplace.

Considering the constant changes and the options they cre-ate, what criteria should you use when selecting a protocol conversion system? The first step in making this important decision is a thorough understanding of current needs. The next step is to compare the products selected for evaluation against a long list of criteria (see the box below).

The last step is to evaluate future requirements, using the same criteria as below, with the addi-tion of ease and cost of any required expansion.

Since value and flexibility are key in the buying process, the

software option presently offers the user many advantages. These include low initial cost, ease of installation, future expansion, many extended features and the ability to react quickly to new demands. Choosing wisely will allow users to enjoy the advantages of protocol conversion and comprehensive micro-to-mainframe communications without the fear of being left behind in the future.

While it may be difficult to identify which suppliers will come out on top in the crowded protocol conversion industry, it is easy to pick the principal winner the end users. Products that will continue to provide ever-increasing capabilities and price performance will be available to them.

Criteria For Selection

When comparing products selected for evaluation, it is important to ask the following questions:

How many terminals can the

product support concurrently? Which terminals are support-

ed and how easy is it to add new types?

What is the increment of ex-

pansion if it is necessary to add more terminals?

Does the quality of the emulation meet your needs?

What additional features and

functions are available?

Is the system adaptable for future enhancement or will it rap-

emandement or will it rapidly become obsolete?

Is the product reliable?

Are qualified references available?

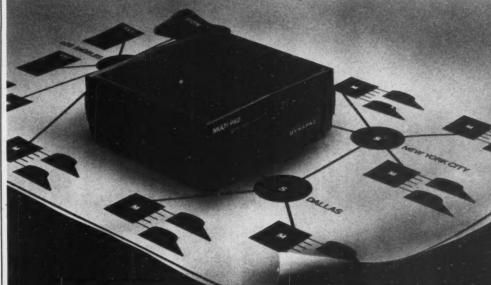
■ What is the quality of the support and maintenance?

Is it easy to install?

Is it easy to use? ■ Is customization easy? ■ Is it cost-effective?

Are there additional or hidden costs?

■ Is a free trial period available?



Multi-PadX.25 Moves Your Network Plans Off The Drawing Board

One Pad Serves Eight

You cut the cost of network access be

Total X 25 Compliance

Multi-PadX.25 complies totally with all three levels of CCITT recommendation X.25.

Works With Thousands Of Terminals Multi-PadX.25 fully supports CCITT recommendation X.3, which means it sup ports asynchronous devices with any of the numerous schemes for data forward ports many proprietary terminal characteristics such as HP ENQ ACK, MAI Basil

Remote Control And Diagnostics

Efficient network operation demands effective access and control. Multi-PadX 25

Keeps Accounting Data Without Fail



BY BRUCE RENARD

Much has occurred, both at the state and confronted by the Federal Communicafederal levels, since the widely heralded tions Commission (FCC), U.S. Federal AT&T divestiture, which took place on Jan. 1, 1984. Although the AT&T breakup the U.S. Congress, but an active role is also has made the general ground rules clearer being played by state regulators at the loin some respects, significant telecommunications issues remain that present an mission (FPSC) is actively exploring these ongoing challenge to industry and regulators alike. Not only is this challenge being

District Court Judge Harold Greene and cal level. The Florida Public Service Commajor issues. An examination of the FPSC's activities sheds light on the regulatory climate at the local level.

The FPSC implemented a system of intrastate access charges for Florida on

Renard is associate general counsel for the FPSC, Tallahassee, Fla.



di

Florida Regulation

Jan. 1, 1984. Apart from the fact that the FPSC's system was in place when divestiture took place, the plan differs from the FCC's interstate access charge system in several significant ways. Although the FPSC approach does address the problem of bypass through a series of differing mechanisms, the plan includes no intrastate equivalent of the FCC's proposed Customer Access Line Charges, originally \$2 per line per month for residential users and \$6 per line per month for businesses. At press time, the FCC access charge plan had been delayed until June 13.

In Florida, nontrafficsensitive charges are borne by the interexchange carriers on a busyhour minutes of capacity basis, a charge based on a measure of how much traffic a particular carrier is placing on the local net-work. This system appears to be functioning satisfactorily and will continue to be monitored for future re-

finement

Several aspects of the FPSC plan could not be fully implemented by the industry on Jan. 1, 1984, and these issues are now subject of further workshops and proceed-ings to develop imple-mentation plans. These include.

■ Definition of equal-access exchange areas for boundaries between competitive toll and monopoly local service.

■ Use of time-of-day or day-of-week pricing.

 Use of tapered, contract and volume discount rates for large users.

Assessment of trafficsensitive charges on enduse customers rather than interexchange carriers

■ Elimination of pooling arrangements contained in the present access charge system. There is an at tempt to replace the pooling arrangement with a sit-uation in which the local companies bill long-distance carriers and customers directly

The Florida commission will investigate and hold hearings on these issues to implement as many features of its access plan as are reasonably possible by

Jan. 1, 1985.

The FPSC continues to process resale and facilities carrier applications for intrastate interexchange Message Toll Service and Wats offerings in Florida. In addition, the FPSC has awarded post-divestiture intrastate operating authority to AT&T for its Florida toll operations.

The FPSC continues to process resale and facilities carrier applications for intrastate interexchange Message Toll Service and Wats offerings in Florida.

AT&T's authority extends to Inter-Local Access and Transport oort Area service and AT&T must come to the FPSC for approval of any bypass links. AT&T is held to continued rate base regulation and 'provider of last resort" obligations for intrastate

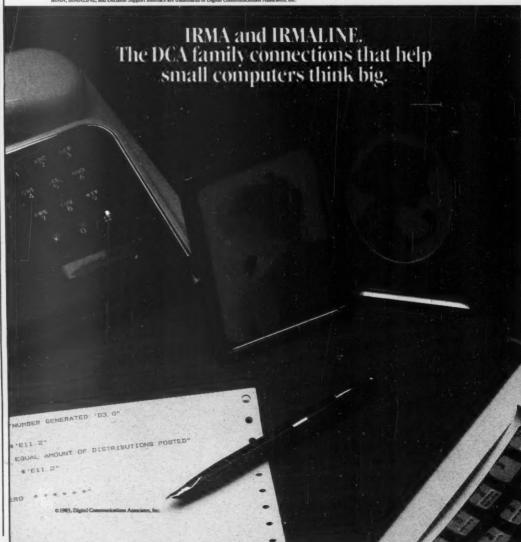
interexchange service.

On a more unusual note, Microtel, Inc., Flori-da's first certified intrastate competitive interexchange carrier, intervened in several other carrier certificate application proceedings in oppo-sition to an award of authority. Claiming that the services of MCI Communications Corp., GTE Sprint and other interexchange carriers will unnecessarily duplicate services already planned to be offered by Microtel, the company has asked that the new intrastate applications be denied. In the same vein,

Here are two beautiful ways to get small computers on line with the mainframe quickly, easily and economically-yours from DCA, home of the industry's first coaxial cable links between small computers and IBM 3270 networks.

PC PC 1BM 3274

IRMA" is the Decision Support Interface" that gets IBM Personal Computers and IBM PC XTs into the 3270 mainstream via direct attachment to 3274 or 3276 controllers.



Microtel has recently ap-pealed the grant of MCI's intrastate certificate to the Florida Supreme Court. This proceeding may clarify how much intrastate competition is public interest." "in the

Last year, the FPSC opened a docket to account for and treat the impact of the AT&T divestiture on local telephone rates and service in Florida. The FPSC has continuing surveillance and re-

It is safe to say that the FPSC and other state commissions will continue to be embroiled for some time in sorting out and reacting to the impacts of the divestiture at the local level.

cord-keeping requirements in place, and it is looking toward a comprehensive hearing and decion the precise sion

amount and treatment of the cost of divestiture sometime later this year.

Most recently, Southern Bell filed tariffs to imple-

ment a \$92.5-million rate increase recouping losses caused by the transfer of the embedded customer premises equipment base

to AT&T under the Modified Final Judgment, the settlement between AT&T and the Justice Department. This request has been consolidated with the larger divestiture impact docket, and the FPSC is now employing prehearing procedures to define precisely how the case will be handled. It is safe to say that the FPSC and other commissions will state continue to be embroiled for some time in sorting out and reacting to the impacts of the divestiture at the local level.

In addition to grappling with the foregoing intrastate items, the FPSC has found itself drawn into various federal telecommunications arenas.

First, the FPSC's interim intrastate Wats plan has been brought before Judge Greene for scrutiny under Modified Final Judgment requirements. The Florida commission subsequently held has workshops to sort out the long-range plan for post-divestiture intrastate Wats in conformity with Modified Final Judgment re-The workquirements. indicate shops that significant questions remain about the appropriate rate, engineering and administrative mechanisms to bring Wats to the subscriber in the best manner possible. The FPSC expects to clarify further its plan for post-divestiture Wats provisioning by June and will await a ruling by Judge Greene during the interim.

The FPSC has also recently written the Congress, regarding pending federal CATV legislation, H.R. 4103. The FPSC expressed concern over the impact on "universal telephone service" of the unrestrained entry of CATV into local telephone company markets. The Florida commission recognizes the magnitude of the policy questions raised by H.R. 4103, with respect to the ongoing viability of a monopoly local exchange environment, and will continue to convey concern to congressional decision makers on this topic.

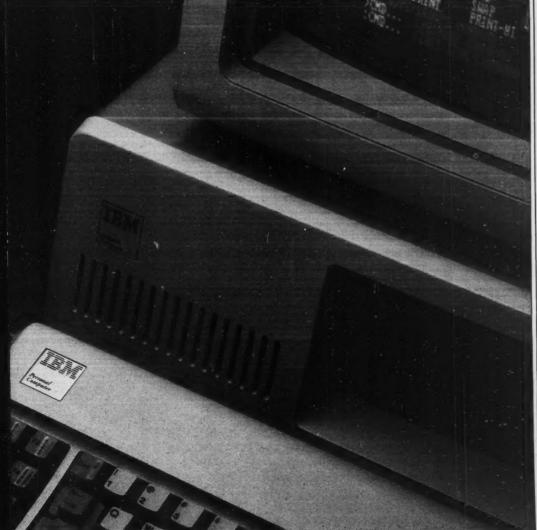
The number of issues facing the FPSC indicates that state regulators in Florida and across the nation will have their hands full for the foreseeable future in sorting out the transition to the Information Age. The key for now, however, is to make sure that this transition is as smooth as possible for the customer who relies on telecommunications network every day.

IRMALINE does the same for remote IBM PCs, IBM PC XTs, Apple Lisas and DEC Rainbows, among others, with just a local phone call to a nearby 3270 controller. Both can go to work literally minutes out of the box. Both provide mainframe data

access, selection and storage, and data communication back to the mainframe. Put first things first. Find out more about the DCA first family of 3270 micro/mainframe connections. For information, write DCA, 303 Technology Park, Norcross, Georgia 30092. Phone (404) 448-1400, TLX 261333

DCA ATL. Or call us toll-free (800) 241-IRMA.

The new home of IRMA, IRMALINE and the rest of the TAC family.





Anyway you look at it, the Datastream 878-15 is an extraordinary 3278 display station.

Look first at versatility. The 878-15 supports five screen sizes. IBM* 3278 Models 2 through 5. Plus DEC* VT100. So you can access any 3270 or minicomputer application from a single display station.

And all five screen sizes can be selected by the host. Or menuselected by the operator.

Then take a look at the 878-15's sophisticated keyboard. It delivers complete 3278 functionality. And advanced 3290 features like 24 top row PF keys, an operator-definable

row PF keys, an operator-definable 10-key pad and more. The 878-15 even offers a port for direct printer attachment.

And that brings us to the simple plug.

The 878-15 is designed for use with Datastream's BSC or SNA Remote Cluster Controllers, which allow the 878-15 to access its host or hosts over



The 878-15 features a standard 3278 keyboard plus 24 PF keys and an integral 10key numeric pad. The 14" screen is available in green or amber phosphors.

ordinary phone lines. All you have to do is plug it into a modem and dial in. Or connect it directly to the controller. Either way, you'll never see the expense of leased lines again.

Together, 878-15 and 178-2 Display Stations and our Remote Cluster Controllers make quite a team.

Offering advantages like sophisticated security. Remote diagnostics. Multiple concurrent sessions. Dual IBM host access. Minicomputer access. And communication with other peripheral devices.

If you're looking for flexible, reliable and inexpensive ways to extend your 3270 network,

Datastream Display Stations and Remote Cluster Controllers are well worth looking into.

Call or write today. Datastream, 2520 Mission College Blvd., Santa Clara, CA 95050. (408) 986-8022. Outside CA, CALL TOLL FREE: 800-952-2500.

*IBM is a registered trademark of International Business Machines. *DEC is a registered trademark of Digital Equipment Corporation. ©1984 Datastream.



RO

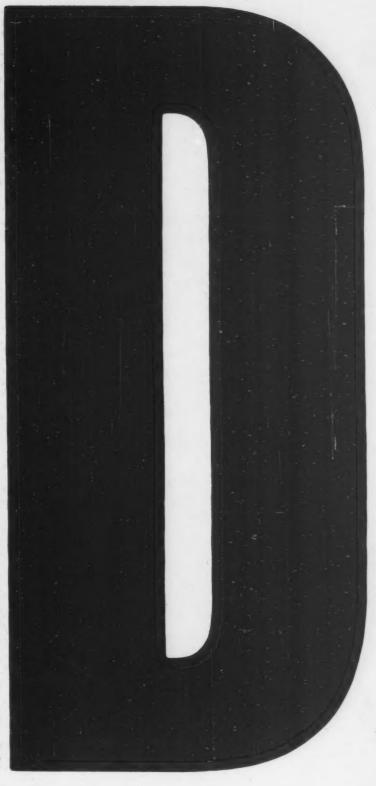
BY STAFFORD HOPWOOD

With the breakup of AT&T and the resultant introduction of greater competition, the environment in which telecommunications companies conduct research and development has changed. Increased attention to marketing brings an emphasis on new product practicality and market appeal. This has a dual effect on telecommunications R&D. First, the emphasis will be on development: Marketers want R&D with immediate practical applications. At the same time, in order for equipment to be easier to use, it must be much more sophisticated. The situation is analagous to computer hardware and software. The more the products accomodate end users, the more initial development work is required.

The change in corporate structure at AT&T has implications for Bell Laboratories, the flagship of telecommunications R&D. Again, there is likely to be a dual effect. First, with an increased emphasis on marketing, expect Bell Labs' inventory of new products to move off the shelf much more quickly than in the past. Second, without the subsidy provided by AT&T, the former giant communications monopoly, Bell Labs is not as likely to take the long view on research as it once did. It is doubtful whether the funds will be available for the kind of leadingedge work that produced the transistor.

Finally, while projected increases in defense spending make continued government subsidies of research likely, closer scrutiny by

Hopwood is a partner in the executive search firm of Ward Howell International, Inc., New York.



Congress can be expected, resulting in calls for R&D work with a more rapid expected payoff.

S EARLY AS 1981 warning signals of this went up when electronics industry officials found them selves working hard to convince a House subcommittee maintain funding for National Aeronautics and Space Administration space communications (Nasa) R&D. Private industry representatives reminded congressmen that Nasa was the acknowledged leadin satellite communications technology research and develop-ment and that it was up to the space agency to take the initiative in such work.

This means that R&D departments are going to be pulled toward the development side of the business, while old sources of breakthrough research are in serious danger of drying up. As a result, the research side cannot be downgraded without incurring a long-term risk of not staying current in technological development.

It is not hard to see that the pressures on R&D managers and technology executives will be intense. There have already been examples in telecommunications R&D of what happens when suffi-cient resources are not committed

to a project. To cite one example, several suppliers trying to develop and produce digital private branch ex-changes (PBX) ran into serious problems during 1982 and 1983. Slow-moving R&D programs were blamed for delays in new product introductions that led to loss of market position. Underestimating the resources and commitment reguired for the effort caused one supplier, Rockwell International Corp., to discontinue R&D of one product after reportedly investing \$20 million.

Other firms experienced long delays in product introduction, suffered key personnel defections and endured acrimonious debate over the continuation of project funding.

The problems, then, are immediate. Unfortunately, there is no quick fix. There is a way to get the most out of an R&D program, but it takes time and commitment to reach that state.

ESEARCH AND DEvelopment is a sensitive industry subject. After all, there is a lot of risk involved. All the unknowns that businessmen do not like to deal with are present in true re-search. That is why telecommunications companies prefer to concentrate on systems development and device im-provement, where the payoffs are more certain. They prefer to let government-funded projects per-

Most commercial R&D work involves the reduction of concepts to practice: taking an idea that exists only on paper and working on it until it is no longer an idea, but a concrete piece of bardware or software. There are several ingredients that distinguish a well-managed research and development department engaged in this type of work: direction, interaction, the right personnel mix and realism.

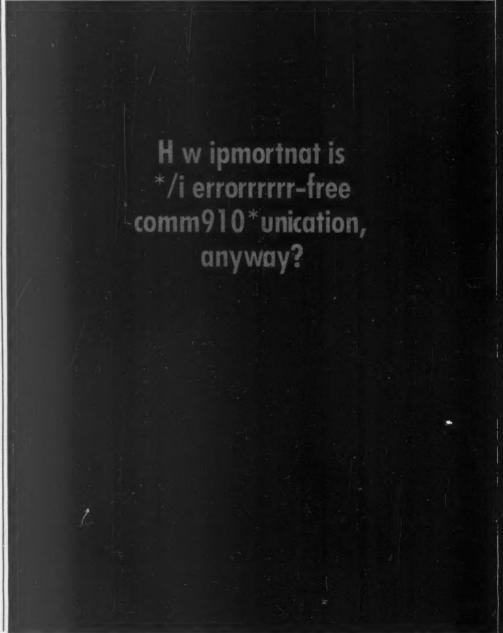
form the work that leads to real a proper course to take. Telecombreakthroughs.

Given the risks involved, this is

munications companies cannot, as a practical matter, be expected to shoulder the costs and risks of between-satellite communications R&D, for example. Their shareholders are not likely to sit still for

Most commercial R&D work involves the reduction of concepts to practice: taking an idea that exists only on paper or in someone's head and working on it until it is no longer an idea, but a concrete, functioning piece of hardware — or software, for that matter. There are several ingredients that distinguish a well-managed research and development department engaged in this type of work. These ingredients are direction, interaction, the right personnel mix and

Many researchers like to feel that they are free to pursue their



work as they see fit, although they usually have more constraints than they care to admit. That feeling of freedom is particularly important. In order for researchers to be most effective, they need to be confident that they are free from heavy constraints

In addition, although they openly profess a desire for freedom, the majority of researchers really do desire some direction in their work. In a good R&D depart-ment, that freedom exists, but its limits are defined. There is a particular objective to be reached, but researchers are free to reach this objective by their own meth-ods. That is the freedom the researchers really want - freedom to follow their own routes to a solution, taking the detours they The majority of researchers really do desire some direction in their work. In a good R&D department, that freedom exists, but its limits are defined. There is an objective to be reached, but researchers are free to reach this objective by their own methods. That is the freedom the researchers really want — to follow their own routes to a solution, taking the detours they need to along the way.

need to take along the way. The next ingredient, interac-tion, is a way of opening up new

avenues toward research solutions. The image of the lone scientist working in a basement lab

Living with errors in computer communications is just another way to play Russian Roulette. Sooner or later something serious is bound to go wrong. Ask the major New York insurance broker where a one-digit miscommunication caused a \$1,000,000 error in a client bill. Or the medical lab where a mistransmitted enzyme count came within minutes of costing a patient's life. But now, Microcom™ introduces the Era 2 SX/1200,™ the stand-alone 1200

baud modem that provides 100% error-free data communications, and that's implements a machine-

easy to operate and cost effective. Era 2 SX/1200 independent, error-correcting protocol, called MNP™ MNP detects transmission errors

between Era 2 modems caused by line interference or low quality telephone connections, and retransmits lost or incorrectly received data.

The new Era 2 SX/1200 is Bell 212A compatible, supports RS-232 devices, and can be rack mounted – a major space saving in large multiple installations. It can store up to nine telephone numbers of 36 digits each, with battery back-up. It has a simple, character-oriented command structure, with control of all modem functions from local devices.

All of the above comes for the remarkably low price of \$599 – about \$100 less than brands that can't deliver 100% error-free performance.

So call, right now, for toll-free information about the SX/1200. The number is 1-800-322-ERA2. We'll send you a complete brochure and spec sheets to show you how dangerous errors in communications are a thing of the past.

Only from Microcom.

comes from the movies, not from actual practice. Some people work well that way, but they con-stitute a tiny fraction of the research community.

O BE EFFECTIVE, REsearchers have to unthe derstand total world in which they work. They need the opportunity to interact with one another. This is the key to the synergy research directors are always seeking. When researchers have the oppor tunity to exchange ideas and information with each other, it makes them more alert to the full possibilities of their work. If research does not yield what was expected, it may still contain a tentative solution to a different problem, a problem that someone next-door is working on at the same time.

It takes a certain critical mass of research people to make this interaction worthwhile. The number required and the number of different fields represented is going to differ among companies. There is no single rule of thumb that says "X number of researchers from X different fields yields

The R&D ingredients described so far are likely to work well with 90% to 95% of a department's personnel. These are the people who do most of the work in commertelecommunications search; they are the ones who reduce concepts to actual practice. The remaining 5% are the ones who provide the concepts. Managing this group presents a tremendous challenge to research direc-

I call the members of this group the "tree choppers." They are the woodsmen who go out first, find the right tree and chop it down. The other 95% decide how to cut it up, what to do with the bark and so forth. They are often difficult to manage, partly because they sometimes have little regard for the conventions and disciplines of business.

The tree choppers also create problems for their managers, who cannot always explain why a project has gone off in an unorthodox direction that is beyond budget limitations and sometimes seemingly deliberately outside corporate goals.

ET IN SPITE OF ALL the problems they create, it is important to have such people, especially when the industry may not al-ways be able to depend on entities such as Bell Laboratories and Nasa for new concepts. That is not to say that the sign of a good R&D operation is a staff top-heavy with geniuses. For example, in a firm with 100 researchers, two to five tree choppers will provide a firm with more basic ideas than its resources are likely to allow it to pursue. To have more than that breeds frustration on the part of those that are generating the ideas and frustration on the part of the company, because the company cannot possibly afford to fund all development opportunities.

HE FINAL, AND IN some ways, the most important ingredient in an R&D effort is a good dose of realism. The most successful companies in terms of research are those in which the economic realities are always part of the total system of management. In such a system, research-

The final, and in some ways, the most important ingredient in an R&D effort is a good dose of realism. The most successful companies in terms of research are those in which the economic realities are always part of the total system of management. researchers know from the start of a project that certain standardsmust be met in order to get additional funding and move forward.

ers know from the start of a project that certain standards, including commercial and financial standards, must be met in order to get additional funding and move forward.

They have to be able to show that their projects will eventually generate products that will yield, for example, a 30% return on investment, or \$10 million in sales. This system, coupled with regular interaction among researchers, fosters what I consider to be a realistic atmosphere in which research and development will flourish. It is the kind of environment in which researchers who go off on tangents for a while are eventually brought back into line by their peers, not by their managers.

This environment even works for the tree choppers who, with a little work on their salesmanship, should be able to show that their work will have a valid application and real payoff, even if it is a little further down the road.

UT TOGETHER, ALL these ingredients result in self-regulating

researchers, ones who feel responsible for the progress of their own work. Most of the R&D departments I have seen do not have this self-regulating behavior. As a result, they sometimes get off-course early in a project, with no system to help them get them back on track.

When problems become severe, top management steps in and cuts off funding, as in the digital PBX experience. Researchers who go through this experience a few times may begin to feel that management will support them only if they follow a given course. As a result, these researchers may become conformists. And they may lose the entrepreneurial drive that probably brought them into the profession in the first place.

As mentioned at the outset, there is no quick fix for producing this self-regulating environment. Probably the most frequently attempted fix involves bringing in managers who have established reputations elsewhere for running innovative research departments. Unfortunately, this attempt alone will not necessarily change the course of events in an R&D program.

To nurture creative research and development, there has to be a commitment from the top for change. Then, it is necessary to find individuals who can successfully handle the desired transformation. It is necessary to find managers who are broad enough to realize that there will have to be changes across-the-board in the company.

These managers must be able to realize that they too will have to adapt themselves. They must work diligently on their peers to make them realize that change will have an impact on them. These managers must convince their peers that it is necessary to change. In addition, they must work to maintain support from the highest levels. These qualities are as important as having a record of R&D success.

We have a number of high performance communications controllers for Digital computers.

8 0 0 - 8 3 2 - 6 2 7 7

and a number for them, too.

In fact, we have more microprogrammable, direct memory access communications controllers than anyone else.

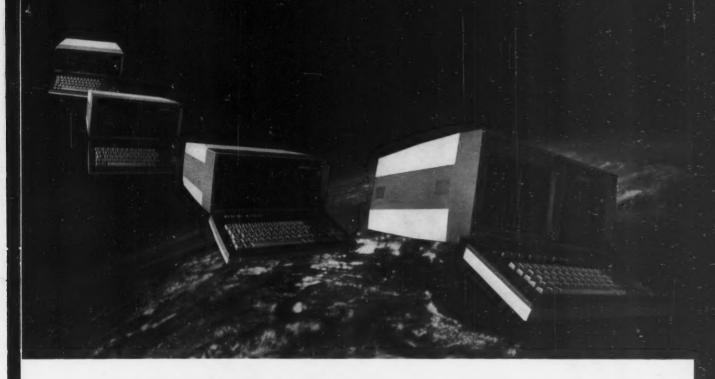
tions controllers than anyone else.
So whether you need a controller for a
VAX/VMS, UNIBUS PDP-11 or Q-BUS PDP-11
system, or to interface a public or private
X.25 packet switching network, Digital has
one that links with just about any computer.

Of course, you also get the full support of Digital, the world's second largest computer company.

Try our number. You'll find the human being on the other end every bit as intelligent as the communications controller we'll fix you up with.



One small step for Digilog. One giant leap for data comm test.



New family of automatic protocol analyzers interpret and isolate the error source for you

Meet the New Digilog 200, 400, 600, and 800 . . . four revolutionary diagnostic analyzers that can actually <u>describe</u> in plain English what is happening on your data lines.

Until now, analyzers more or less just displayed the data or the protocol. You had to do all the interpreting. . . and figure out the error source yourself.

Now the new Digilog analyzers can decode and interpret the protocol for you. Isolate faults automatically. Exactly. Even statistically analyze performance on your data lines.

Compare the new Digilog technology with anything else. Suddenly, we're a generation ahead of them all.

Digilog 200, automates data comm testing

Now, first time users can perform like experts. And seasoned professionals can do more . . . faster.

The Digilog 200 sets up automatically. Decodes protocols automatically. Analyzes

protocols automatically. Tests devices automatically. And, of course, identifies the faults automatically. Sound easy to use? It is

And, for flexibility, the Digilog 200 has just about any capability you can think of— EE PROM packs for program or data storage, remote control, typewriter-like keyboard, full programming, menu driven traps and triggers, CRT, help screens, six BERT tests, interface breakout, printer output, etc.

Digilog 400 and Digilog 600 For even greater sophistication

Here the emphasis shifts toward versatility, power and higher speed . . . up to 72K bits/second.

You get more programming power, bigger CRTs, built-in $3\frac{1}{2}$ " micro disks, soft function keys, graphics, protocol simulation plus all the features of the 200.

Digilog 800, the new technology

Meet the world's first protocol/performance analyzer.

Use the 800 to conquer the toughest data comm problems. Debug software programs. Improve the performance of your network.

The Digilog 800 offers you every conceivable diagnostic capability. Including fully selective and bit image recording, full protocol simulation, automatic protocol analysis through level 3 (X.25, SNA, etc.), and speeds to 256K bits/second.

The Digilog 800 also gives you on-line color graphics, internal 10 megabyte disk with selective logging and comprehensive statistical analysis with reports.

Nothing else comes close.

Digilog is out in front

Want to see what the new generation of Digilog analyzers can do for you? Call now for a demonstration (215) 628-4530.

Digilog Inc., Network Control Division 1370 Welsh Rd, Montgomeryville, PA 18936

DIGILOG



Special Section: The Olympics

GO FOR THE GOLD

By Bruce Hoard

The torso of his massive body momentarily obscured by a sprawling plant, Al Oerter first comes into view from the waist down as he approaches the receptionist's desk. His legs are slightly bowed, as if fatigued by carrying around a constant load of 285 tightly muscled pounds. Still, they move easily.

When his top half appears, Al Oerter looks every bit the fourtime Olympics discus champion he is. No other Olympian before or since has done what Al Oerter has done — win a gold medal in four consecutive Olympics. No other Olympian has ever accomplished what Al Oerter is striving for — another gold medal in his fifth Olympic Games. And at the decidedly post-Olympian >

Hoard is editor of Computerworld On Communications.

age of 47. He has also designed some pretty fair data communications networks here for his employer of 20 years, Grumman Data Systems Corp. Add to that his time creating automated numerical control systems, programming and managing programmers, and the final product is an experienced DP/data communications professional.

So which is he first and foremost: Al Oerter the unparalleled Olympics champion or Al Oerter the veteran high-tech expert? How does he balance the two worlds of athleticism and Grumman Data Systems?

"I've never been asked that before," he replies with a relaxed laugh, seemingly surprised that he could be asked an original "The two are complementary," Oerter says of discus throwing and his professional career. "Each is trying to perfect its own craft. I'm trying to perfect the throw and gain a place on the '84 Olympics team, and obviously Grumman is trying to perfect its technology. It is difficult to win gold medals, and it is difficult to stay completely in front of so many technologies in the computer field."

question after nearly 30 years of interviews. Leaning back in his comfortable conference room

chair, he contemplates the two worlds.

"The two are complementary,"

he says of discus throwing and his professional career. "Each is trying to perfect its own craft. I'm trying to perfect the throw and gain a place on the '84 Olympics team, and obviously Grumman is trying to perfect its technology. There is a sense of accomplishment when it is done, and it's very hard to reach. It is difficult to win gold medals, and it is difficult to stay completely in front of so many technologies in the computer field."

T 47, HE STILL HAS a full complement of swept-back blond hair that is barely tainted with the faintest streaks of gray at the temples. His face — friendly and susceptible to frequent smiles — is an interesting study in lines. The chin is deeply clefted, the nose round and prominent. A slight scar curls down from just under the right nostril to the corner of his mouth.

On this cold, snowy March day, he wears woolen slacks, a beige sport shirt and cowboy boots. The shirt is filled out in a way your average 98-pound weakling can only dream about. Stated simply, his upper body is a solid mass of muscle topped off by mountainous shoulders that taper down to a slightly paunchy waist. The man is strong, strong enough to bench press 450 pounds during a normal workout.

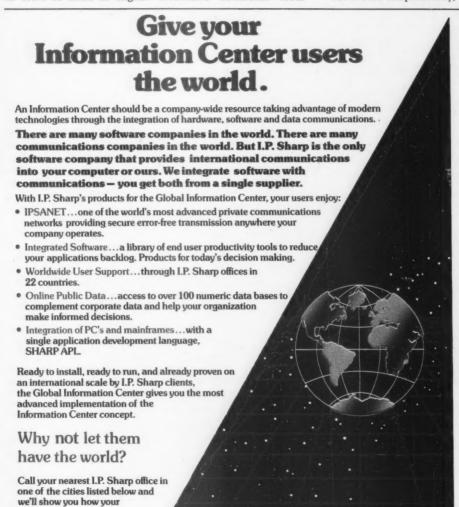
He speaks in deep-throated gravelly tones that befit his uncommon physical stature. Over the telephone, his rolling thunderous voice is intimidating and aloof. In person, he warms up quickly. Go ahead, call him Al, it's OK.

ONTINUING HIS parallels of the two worlds, he speaks of how the computer world demands more thought while the discus is more of a physical discipline that still requires a great deal of thought. For Oerter, it is all positive thought. He will not allow himself to believe that something cannot be accomplished. He defines himself and Grumman as "very competitive by nature."

The side of him that gives motivational speeches to large corporations emerges as he notes the requirements for success. "Athletes don't get something for nothing; they have to pay a price," he notes. For them, that price is time and training.

Nothing is free for computer professionals, either. If they don't pay a price to gain the latest technology, they will fall by the competitive wayside. Passivity is not rewarded. "It's the achievement capability in both worlds, and both have the same basis," he ex-

"Nothing comes without the



L.P. Sharp Associates

Information Center users

Products for the Global Information Center

I.P. Sharp Associates Limited 2 First Canadian Place, Suite 1900 Toronto, Ontario, Canada M5X 1E3 (416) 364-5361

Aberdonn, Amsterdam, Atlanta, Boston, Brisbane, Brussels, Calgary, Camberra, Chicago, Copenhagen, Coventry, Dallas, Denver, Dublin, Düsseldorf, Edmonton, Frankfurt, Halifax, Helsinki, Hose Kong, Houston, Loodon, Loo Angeles, Madrid, Melbourne, Mesico Citz, Miami, Milan, Montreal, New York Car, Newport Beach, Oslo, Ottsusa, Palo Alko, Paris, Rochester, Rome, San Francisco, Saskatson, Seather, Soud, Singupore, Stockholm, Sajohus, Yoloy, Oronto, Vencouver, Victoria, Menna, Warrington, Washington, Wayne, White Palins, Wannington, Washington, Washington, Vagure, White Palins, Wannington, Vagure, Water Burns, Wanney, Water Marin, Wannington, Washington, Vagure, Water Burns, Wannington, Vagure, Water Burns, Water



Oerter goes for his first gold medal and sets an Olympics record at the 1956 Games.

necessary quality and quartity of work," he says.

Oerter's two worlds are not always mutually exclusive of each other, he says, holding a plastic coffee cup that looks like a thimble in his mighty hand. His athletic training is aided by such high-technology-based tools as biomechanical analysis, a photographic technique that digitizes athletic movements from frame to frame in an effort to break down form and movements to their most rudimentary parts. Acceleration, deceleration and trajectory can all be examined and improved.

These techniques are no substitute for a coach, he points out, but Oerter has never cared much for coaches anyway, preferring to work the kinks out of his admittedly unorthodox throwing style by himself.

The solitude of the discus drew him to the sport when he started hurling it with authority as a collegian at the University of Kansas in the late '50s. Alone, he can simulate competition — other athletes, their throws, their weaknesses — and do what he has to do to win. With Oerter, there is no magic formula, no divine intervention from high on Olympus. It just comes from within. Give it your best shot, concentrate and enjoy.

Sometimes he thinks about throwing at work, but has he ever had inexplicable visions of RS-232 plugs or modems pop into his mind during a competitive discus event? "In my 1½" or two-hour

training sessions, I don't let a hell of a lot of extraneous things enter my mind," he says. "I can walk away from considerations having to with communications or computers."

Asked which of the two worlds is most important to him, Oerter reveals a seemingly contradictory trend. "It's changing," he de-clares. "A long time ago, I decided rather than become a professional athlete — I had the leverage to throw anything and the size to play ball - I decided to have a family and career." Oerter raised two daughters after a divorce from him first wife. Now that his daughters have grown up and moved out, he finds himself drifting more toward the athletic side of his personality. Cathy, his 31-year-old bride of less than a year, is symbolic of that shift in life-style. The reigning New York state women's long jump champion, she is much more in tune with her husband's athletic needs than her predecessor. As Oerter puts it somewhat ruefully, "If you have some major things in your life, your wife better be in touch with them."

It's not that he wants to put more emphasis on the competitive side of his athletic life. What he wants to emphasize and expand on is the motivational aspects of sports. He gave between 25 to 30 motivational speeches last year, charging as little as \$1,500 and as much as \$10,000. He has spoken about 10 times so far in this Olympics year, but will

tail off as the June 23 team tryouts approach. Oerter gets satisfaction from

helping people achieve goals, satisfaction he cannot get from working with technology. "You can't get a response out of making the perfect network," he says.

There will also be an Al Oerter book. As he describes it, it will be wide-ranging, covering everything from garnering gold to raising his two daughters alone.

ERTER CAME TO Grumman in 1959 shortly after graduating from Kansas. As he described his beginning, "I just knocked on the door." Of course, he wasn't your average anonymous job applicant, already won the first of his gold medals at the 1956 games in Melbourne, Australia, three years earlier. Grumman put him on in its procurement department. After a couple of years there, he moved over to the newly created electronic data processing department. There, he put his "half-baked technical degree" (he degree" (he started school with an engineering major, later switching to business) to work automating purchase orders as a programmer on such historical computers as the IBM 770 and 1401 series.

By the late '60s, he had moved up to managing programmers,

and in 1970, he branched off into data communications, an area he describes as "fascinating because of all the change."

He worked on a team responsible for the development of local and national networks, as well as the installation of front-end processors. The team established remote computing sites at technical and sales branches and put up "fairly large pipes" between the facilities. "At one time, we had nine 56K-byte digital links between Long Island and Boston," he recalls. Oerter felt as though he was making a real contribution to Grumman through his communications efforts. "You helped the corporation expand in a real way. You had a direct impact on the corporation," he says.

Two years ago, he moved out of communications and into another hot technological field: factory automation. More specifically, he is involved in distributed numerical control (DNC) systems, an area he wants to work full-time in after the games. Currently, he is working approximatley half-time as he prepares for the team try-

His responsibilities in the DNC realm include helping the firm become an integrator of "bits and pieces of DNC systems." The idea is to have the machine tools operate under the control of a CPU communicating with smaller com-

Incredible as it seems, even Big Blue needs to be bailed out now and then. Personal computers are such a runaway success, they're running Information Managers ragged. The problem is personal computers and

mainframes don't always work together.

The result is Computer Shock. And nothing short of a HERO™ can cure it.

HEROISM COMES TO PERSONAL COMPLITING

HERO is the intelligent, desktop Networked Personal Computer from MDS*. It does everything a personal computer can do. And lots that it can't. But HERO's main fame derives from its interaction with the mainframe.





GENCE AT EVERY STAT

Mated with the MDS SUPER 21™ Communications Processor, HERO can converse intelligently in IBM networks. HERO emulates IBM 3270 SNA and the 3776 remote-job-entry systems. Our

SUPER SNA™ option gives you both on one communications link. HERO runs software under MS-DOS. Plus its own multitasking operating system.

HEROS UNITE AND CONQUER

With MDS HERO and SUPER 21, you can access private, departmental and corporate databases. Instead of not working, your entire organization can be networking. Under your control.

And only MDS offers you INTELLIGENT 3270™

So you can write your own programs and integrate them with data in the mainframe. HERO lets you retrieve information from the database, process it, display it and update it. Then either return it or store it locally.

N HEROS NEED ALLIES

In addition to HEROS, SUPER 21 is available with non-intelligent workstations within INTELLIGENT 3270 networks. MDS offer the PLUS 80™ family of

plug-compatible controllers, printers and displays. They're directly interchangeable with corresponding IBM 3270 units.

MDS HERO MAKES A HERO OUT OF YOU.

With HERO and SUPER 21, your existing data processing investments become part of an ever-expanding fund of available data. All of it coordinated. cost-efficient and controllable.

MDS systems are planned for non-obsolescence. They're modular in design to accommodate future growth. So every MDS system, like a hero, is immortal.

GET THE ADVANTAGES OF BIG WITHOUT BEING BLUE

MDS is a multidivisional, multinational corporation. MDS offers service and support capability around the We've grown by helping our customers to grow. By focusing our size and scope on responsiveness to their needs. Not just in IBM country, but beyond.

We can do the same for you, wherever you are.

world, around the clock.

Ask our customers about us. And give us a call. Dial 800-MDS-HERO. We'll show you how, when it comes to networking, MDS can help you unite and conquer.



7 Century Drive, Parsippany, New Jersey 07054, And over 430 locations, worldwide



puters attached to the machine tools themselves. The main computer will speak a universal parts program language that routes programs to the local computers. Oerter is bringing his data communications background to the DNC task by setting up links for the numerical control programmers and others who manage inventory and data collection.

"These networks have all the things you want to find up on some broadband network that snakes its way through a production area with arc welders and high-interference machinery," he explains.

ERTER WAS BORN IN the Astoria section of Queens, New York, in 1936. The son of a plumbing contractor, he had a comfortable childhood. "It was a great place to grow up," he recalls of the polyglot Italian, Ger-man and Czech neighborhood. His father uprooted Oerter, his mother and sister, moving them to Long Island when Oerter was

He remembers his father as a "mini-entrepreneur," an aggressive businessman who inherited business from his Keeping things in the family, Oerter plans next year to buy his father's house on Estero Island in Fort Meyers Beach, Fla. He

will retire there for the winters in

around five years.

Oerter is unpretentious despite his unprecedented athletic fame. Little-known here in the U.S., he widely admired in Europe, a continent that takes its epic athletic heros seriously. Oerter couldn't be happier about his relative anonymity here at home: The last thing he wants to be is a a celebri-

"I absolutely do not consider myself to be even a minor, minor celebrity," he declares with con-viction. "If I couldn't go to a resviction. "If I couldn't go to a taurant with total anonmyity. He pauses, obviously disturbed by

the prospect.

Then he picks up again by mentioning a famous athletic friend, Bruce Jenner. Oerter sees Jenner in the fast lane of Los Angeles hype, beautiful people and nonre-"I like Bruce; I just jazz him every time I see him," he says. Oerter has been out to dinner with the beautiful people, and he doesn't like what he sees in their public images. "Fame changes public images. people between their homes and the public. Their personalities change. I don't know if their egos feed on it or if they become defensive," he observes

Oerter's unpretentiousness is evident to his co-workers. Inez Bodensiek, who was Oerter's secretary for eight years, says, "He's a super guy, easy to work with, has a

great personality and a keen sense of humor. He's always the same; his personality never differs. He's his personality never differs. He s easygoing and pleasant." And Oerter applies the same disci-pline to his professional work as he does to throwing the discus. He is "conscientious, diligent, thorough and very fair," Bodensiek savs

Why is he attempting this improbable comeback after already

having reached such pinncacles?
"Because it feels good," he ripostes. "There's a chance I can make it even though I am working at a theoretically advanced age for this sport — perhaps any sport," he adds with a laugh. Oerter, the perennial underdog, points out that he is in a position similar to the one he was relegated to be-fore the 1968 Mexico City games, his last gold medal Olympics. He wasn't given much of a chance then, either. For Oerter, the more things stay the same, the better.

He is currently ranked fifth in the U.S., a lofty ranking for someone pushing 50. At various times, he has competed against and beat all four of the athletes rated ahead of him. He acknowledges that those victories are in the past and cites the "dissipated" state he has allowed himself to lapse into during the past few years on the banquet circuit.

Despite that less than sanguine sentiment, Oerter is well on track to making the team. Last summer, he said he wanted to be throwing in the 220-foot range by now. (The world record is just over 235

feet.) He reached 225 feet, five inches last November. About two months ago, he hit 210-feet in "very cold weather" with no wind to aid his throws.

Between now and the June tryouts, he wants to compete every second or third week before arriving in the Los Angleles Coliseum for the June trials. His most important concern at this point is his health. An elbow or knee injury could bring his comeback to an abrupt and final halt.

Beyond that, he wants to increase his strength by 3% or 4%. He feels strong now, so it is time to convert that strength to throwing distance. For that, he needs some decent weather, which seemed doubtful at best on Long Island in March and April. Right before the trials, he will spend at least two to three weeks at "nothing but intense work. That is eliminating all considerations of professions and family and everything else," he says. And what if he doesn't make

the 1984 Olympics team, what if the champion's internal spirit that prevailed four times previously at the height of Olympics competition abandons him on the floor of

the Coliseum?

"I'll be disappointed, in all honesty," he says. "I don't know how to explain it to people," he adds, halting briefly to find the words. "It is not a crushing environment at all, because I really do believe in all honesty that I will be at my best. What else can I ask of myself?"

Special Section: The Olympics

TEMPORARY TELEPHONES

By Katherine Hafner

If preparation for the Olympics is traditionally an exercise in taking care of countless details, then the 1984 Summer Olympics, dispersed over 4,500 square miles in Southern California, promise to surpass past games in the demand for battalions of logistics wizards. In June 1982, AT&T signed a contract with the Los Angeles Olympics Organizing Committee (LAOOC), along with Pacific Telephone, the former Western Electric and the Yellow

Hafner is senior writer for Computerworld On Communications.

Olympinet

Pages directory, to donate at least \$4 million in telecommunications services to the committee. Thus, AT&T became an official sponsor of the 1984 Summer Olympics in Los An-

geles.

Should you think that this entails running a little temporary cable through a few buildings and tapping a few dozen trunk lines into the local telephone think company. again. AT&T's investment in the temporary telephone system for the games has soared to much more than its initial \$4-million commitment. And the total excludes the cost of more than 20 Dimension private branch exchanges (PBX), 6,800 standard single-line telephone sets and 700 electronic custom teleinstruservice phone

ETTING UP the temporary telephone sys tem for the Olympics involves nothing less than providing phones and communications capabilities to 23 sports venor sites, three Olympic Villages, 4,000 coaches, 12,000 athletes, 3,000 national and international officials and 45,000 LAOOC employees volunteers — and all of it dispersed throughout an area nearly the size of the state of Connecticut. The telephone system will operate for 16 days and then be dismantled, leaving little or no trace of itself

AT&T's voice system for the Olympics will be the largest temporary phone system ever built. In planning and implementing the system, AT&T worked with LAOOC to develop a site plan for each sports venue, as well as the Olympic Villages, ABC's International Broadcast Center (IBC), the Los Angeles Convention Center and the LAOOC headquarters in Marina Del Rey.

Each sports location will have its own PBX with a console operator and message center. The console operators will also work with the electronic messaging system (see story on Page 55). If a person cannot be reached by telephone, the message will be entered into the messaging system to be read by its intended recipient.

Installation of the system began with a Dimension 2000 placed at the LAOOC headquarters in Marina Del Rey last AuIf you think this entails running a little temporary cable through a few buildings and tapping a few dozen trunk lines into the local telephone company, think again. AT&T's investment in the temporary system has soared to much more than its initial \$4-million commitment.

gust, to serve the 1,200 LAOOC employees and others organizing the games. The rest of the network is gradually being phased in and is expected to be up and running by the time the first event starts on July 28. Fourteen of the PBXs for the temporary voice system are Dimension 400s, the smallest of the Dimension product line. Five of the PBXs will be Dimension 2000s, to be placed in the busiest areas such as the IBC, and the remaining three switches will be the medium-sized Dimension 600s. AT&T employees working on the temporary system are careful to point out that the AT&T voice gift is just



"There's a c on your

*Office replies June 30, 1964. Major credit: and required for individual memberabip.

© 1964 Intelligent Technologies International Corp. PC Eachange and intelligent Technologies are trademarks of intelligent Technologies International Corp. THE SOURCE is a service mark of Source Telecomputing Corp., a subsidiary of The Reader's D

voice, and users who want data transmission capabilities must provide their own terminal equipment and modems.

According to Robert Fox, AT&T's project manager for the voice system, the analog Dimension PBXs were chosen over the newer digital Dimension System/85 because the Dimension switches are "tried and true" with an installed base of 40,000. "We considered the Systems of the System of t

All the phone sets will be custom-built for the Olympics, with black bousing and face plates decorated with the Olympics logo of a red, white and blue "star in motion." The 900-type sets will feature call waiting, forwarding and bolding, automatic call back and call pickup.

tem/85, but since it was in controlled introduction and had the same features

as the Dimension, we chose Dimension because it is a proven system, and we already have people trained on it." All the telephone sets will be custom-built for the Olympics, with black housing and face plates decorated with the Olympics logo of a red, white and blue "star in motion." The 900-type sets, which are single-line push-button telephones, will feature call waiting, call forwarding, automatic call back, call holding and call pickup.

There will be various classes of restricted telephone service, ranging from intravenue to international dialing capability. "Restrictions are very important," Curtis Motley, assistant manager for the voice communications system, noted.

"For instance, it's doubtful you would want to give many of the athletes international dialing capabilities," said Motley, who works at AT&T's PBX manufacturing plant in Denver.

For cabling, much of the telephone system will rely on existing underground lightguide fiber-optic cabling installed in 1981 by AT&T for Pacific Bell, which provides a vast network throughout the Los Angeles area (see story on Page 61).

N ADDITION TO the existing light-guide network, much of the of the cable is being laid outside, because most of the events are being held outdoors. And along with 300 miles of fiber-optic cable, 500 miles of other cable will be laid along fences, over trees and through tunnels. Such cabling will be done partly by AT&T and partly by Pacific Bell and GTE, the two local telephone companies providing the trunk lines for each site.

"Traditionally, local telephone companies have done the outside cabling," Fox commented. "Our installers are not trained to run up telephone poles. We don't know all the rules governing cabling, such as wire gauge and the like.

"We figure we might as well pay them to do it rather than train a lot of our own people," he continued.

A particularly challenging bit of cabling will be the wiring of the Lake Casitas area, a venue for the rowing competition 84 miles northwest of Los Angeles. The judges' stand and the start and finish lines, all of which require telephones, will be on floating rafts in the middle

It's a call from a customer in New York who needs specifics on a business proposal. You talk briefly and then transmit the data to him in seconds from your IBM* PC with PC Exchange.™

and their training the data to min in seconds from your IBM® PC with PC Exchange.™

Later, an electronic mail message arrives from your Houston office. New developments necessitate an immediate multi-city business trip. Over your IBM PC, you make arrangements with your travel agent. Then you contact an information network for the latest weather in the cities you'll be visiting.

All through your IBM PC. All made possible by PC Exchange—a versatile, dynamic and interactive communications package on a single pc board. Complete with software and tutorials.

With PC Exchange your IBM PC becomes far more than a computer.

PC Exchange: from the people who brought you PC Express.

PC Express was welcomed by PC users everywhere. It packed a number of valuable communications capabilities onto a single pc board occupying just one expansion slot.

occupying just one expansion slot.

Now we've made a good thing even better.

We took all the PC Express capabilities, added some exciting new ones, and gave the entire package a new name: PC Exchange.

Through it, you can exchange voice and data communications—directly or remotely—with other IBM PCs, PC-compatible computers and mainframes.

For example, with PC Exchange, your PC can perform DEC™ VT100/52 emulation and allow you to access all major information networks such as THE SOURCE.™ Membership in THE SOURCE is included with your purchase of PC Exchange.*

PC Exchange also puts at your command a

powerful, fully-integrated telephone management system which includes a full-screen text editor, an "Electronic Phonebook," electronic mail capability, an onboard modem, auto-dialing, autoanswering and more.

Available now: SNA 3270 and 3770 RJE.

If your company has an IBM mainframe, chances are it's being overworked and yet, underutilized. People just can't get the data they need when they need it.

The answer: PC Exchange with SNA. With it, your PC can communicate with your IBM mainframe, and emulate a 3274 cluster controller, 3770 Remote Job Entry station, and 3278/9 terminals with multi-session capabilities.

Multi-sessioning gives you the ability to be connected concurrently to four different mainframe applications and toggle back and forth, without logging on and off. For MIS managers, connecting PCs to

For MIS managers, connecting PCs to mainframes is an effective, cost-efficient way to reduce host processing loads. So, PCs can become an integral part of the corporate information environment.

For a free demonstration, contact your nearest PC Exchange dealer. For the address, call 800-523-8396. See what a dramatic change PC Exchange can make in the speed and efficiency with which you gather and use information.

with which you gather and use information.
Intelligent Technologies International Corp.,
151 University Avenue, Palo Alto, CA 94301,
[415] 328-2411. 800-523-8396. Telex: 756175.



all for you IBM PC."

Olympinet

of the lake. To provide telephone service to the floating platforms, five miles of cable will be run along part of the lake's shoreline, then underwater to the platforms.

Troubleshooting of the system is done by a team of technicians stationed in strategic locations throughout the Olympics area. Any problems with a telephone at a site are first reported to the AT&T operations control center in

AT&T bas also devised a disaster recovery plan with full backup procedures in the event of power failures or "sabotage" activities such as the cutting of cables, terrorist acts or "bostage situations," according to Jim Peltier, an AT&T installation supervisor for the games.

Los Angeles, then a regional technician is dispatched to the site.

The manual troubleshooting is complemented by a remote maintenance

test system, located in the Southern Califoria installation office in Los Angeles near California State University at Dominguez Hills. Using the remote maintenance test system equipment, installers and technicians can test, monitor and modify the 22 PRXs

AT&T has also devised a disaster recovery plan with full backup procedures in the event of power failures or "sabotage" activities such as the cutting of cables, terrorist acts or "hostage situations," according to Jim Peltier, an AT&T installation supervisor for

the games. When the Olympic competition begins, the telephone system must be running flawlessly with little margin for error, as it will be in constant use for 16 days. On a much smaller scale, the temporary phone system was tested last summer at an international cycling invitational in Los Angeles. According to Fox, last summer's test went smoothly, and sug-gestions for system modification were taken back to the Denver PBX plant for implementation.

INCE LAST summer, the implementation and operation of the system has changed drastically: The effect of the AT&T divestiture on AT&T's Olympics sponsorship has been extensive, according to those responsible for putting the voice system together. "Divestiture has definitely taken its toll," Peltier ob-served. "The divestiture forces us to operate at arm's length with the operating companies. And yet the involvement between AT&T and Pacific Bell is very close at the Olympics. The only way we can meet the demand is a joint effort so we can augment exist-ing systems."

The constraints of the

the constraints of the divestiture of the Bell System require that all dealings between AT&T and Pacific Bell or General (Continued on Page 54)



This AT&T Pictogram identifies telephone locations.



GIVE PERSONAL COMPUTERS THE SNA OR BSC NETWORK RECOGNITIO

Now there's a software and hardware package by Pathway Design that features a multi-tasking modular architecture allowing personal computers to be intelligent and effective in SNA or BSC networking environments.

Get 3270/3770 Functionality Without **Expensive Protocol Converters or** Controllers.

Our software products and communications adapters enable your PC to inexpensively emulate 3270 Information Display System devices or 3770 remote job entry stations. And, they include many value-added communications features for unsurpassed versatility.

The Communications Adapter You Only Have To Plug In Once.

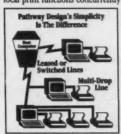
Access a wide variety of communications networks without ever changing the board. When you plug our board into an available PC expansion slot it acts as a multifunction circuit board supporting SNA/SDLC, BSC, HDLC and asynchronous protocols.

Discover Enhanced File Transfer Capability.

With our 3770 you can transfer a variety of files to many different locations in suitable data receiving formats. You can upload or download information to your screen or to a disk. And, the 3770 offers newlyenhanced file transfer capabilities including the transfer of executable images and ASCII text files plus standard data files and ICL commands.

Host-Initiated And Local Multiple Concurrent Printer Support.

Pathway Design products give you the ability to configure multiple printers and perform host-initiated and local print functions concurrently and independently.



A unique printer matrix feature helps you define printer operations. A useful "printer busy" condi-tion informs the PC or host initiator when either printer is in use or available. And, you can continue to enact other non-print functions while all this is happening.

Pathway Design's Three Part Architecture. The Most Powerful PC-Mainframe Link For SNA and **BSC Networks.**

By combining communications services with presentation services and device drivers, Pathway Design provides the user with an unparalleled array of capabilities for both current products, and for easy enhancements in the future.

Currently, Pathway Design offers SNA and BSC communications links with 3270 and 3770 emulation. Our

products operate on the IBM® Personal Computer and compatibles, and soon on Unix "-based super-micro

No One Can Emulate Pathway Design For Products, User Support And Price.

Pathway Design products come with a lifetime software warranty and are supported by our 800 HOTLINE NUM-BER. Complete easy-to-use documentation is always provided. And, the best thing about Pathway Design products is the price.

Send the coupon below for further information on Pathway Design products, now in use in hundreds of locations. Or, for a faster reply, call 800-343-0515 (617-237-7722 in Massachusetts). Soon you'll see why no one can emulate Pathway Design products.

		-
Find Ou	t How You Can Give Your	
Persona	Computer The Mainfram	e
	Recognition It Deserves	

Yes! Please send me further information on Pathway Design mainframe-personal computer communications links

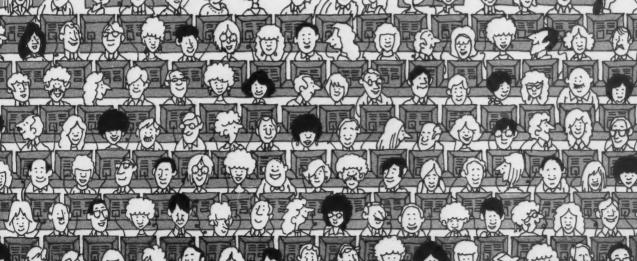
Company

Address City State

Zin







"If the auto industry had done what the computer industry has done in the last 30 years, a Rolls-Royce would cost \$2.50 and get 2,000,000 miles per gallon."



Computers aren't just an industry, they're a revolution in the way mankind operates. And no one covers this revolution better than we do!

We are CW Communications/Inc. and despite our youth (only 15 years) we're the world's largest publisher of newspapers and magazines for computer people all over the world.

Most of our publications are weekly newspapers, because so many things happen so rapidly in the computer business (as the headline quote from a prominent

industry executive makes so clear). In only thirty years the industry has gone from the development of the giant Eniac system, through the tube-powered, water-cooled

Univac I (the world's first business computer), to the incredibly cheap, battery-powered microprocessor.

But as unbelievable as the last 30 years have been, the next 30 will probably be even more incredible. In the next two years alone, the installed power of

general purpose computer systems will grow almost as much as it did in the previous 16 years. And the supercomputers of the 90's will transfer data at a rate several hundred times faster than even today's speedy computers! It's hard to remember this is real science, not fiction.

This extraordinary increase in efficiency has led to a rapid expansion in computer use, as human ingenuity finds more and more applications for these powerful tools. So the market for computer products and services has turned out to be more elastic than most observers had thought.

Worldwide expenditures are currently at \$90 Billion, and growing by 20% a year.

A constant flow of new products; rapid changes in technology; more and more new applications; and large and growing expenditures. It's an industry with a strong need for current, complete and accurate information. Which is where we come in.

Our oldest publication is COMPUTERWORLD, a weekly newspaper with a growing all-paid circulation in excess of 120,000 (quite an increase from our modest 7,500 in 1967).

COMPUTERWORLD serves America's computer users with the consumer-oriented, objective information they need. And it has become America's top business/professional publication, measured by advertising revenue.

ISO WORLD is our semi-monthly publication for retailers, dealers, distributors and other independent sales organizations (ISOs) in the resellers marketplace. This is a relatively new marketplace which has grown up around the minicomputer and microcomputer, and which shows every sign of very rapid growth for at least the next decade.

The latest phenomenon of the computer industry is personal and desk-top computers and we're covering it with our newest publication, INFOWORLD and PC WORLD. INFOWORLD is a weekly newspaper for all micro users and it features complete

software and hardware reviews, while PC WORLD is a monthly magazine devoted to users of the IBM PC and compatibles.

The United States alone accounts for nearly half of the worldwide computer market, but billions of dollars are spent by foreign computer

people for American-made computers and computer products. And our publications penetrate those marketplaces, too.

We are publishers of newspapers and magazines in the following markets: Australasia, West Germany, United Kingdom, The People's Republic of China, Japan, Brazil, Mexico, France, Spain and Denmark.

And we provide U.S. advertising representation and editorial services to publications in the following countries: Italy, Greece, The Netherlands, Sweden, Argentina, Chile, Southeast Asia and Kuwait.

Our International Marketing Services Department can give you one-stop advertising service for any or all of these publications — including translation and production services. We'll even bill you in U.S. dollars, so it's easy as advertising in U.S. publications.

Computing is an exciting industry, with a unique need for information. And the publications we produce provide that information to nearly two million computer-involved people around the world. They are excellent vehicles for reaching these people with your advertising message, and we'd be happy to give you more information on any of them. Just call or write, Don Fagan, Vice President, Sales.



375 Cochituate Road, Box 880 Framingham, MA 01701 (617) 879-0700

A Case of Mutual Back-Scratching

AT&T and the Summer Olympics. It's as natural a combination as airports and rental cars.

The connection between the recently divested communications conglomerate and the Los Angeles Olympics Organizing Committee (LAOOC) is the very substance of mutual back-scratch ing: LAOOC gets the most sophisticated temporary telephone system ever built; in return, AT&T gets a plenitude of much-needed and free publicity.

Because the 1984 Sum mer Olympics are operating without the benefit of public subsidy, one of the major sources of income is corporate sponsorship. By dint of having contributed a minimum of \$4 million to the committee, AT&T is the official telecommunications sponsor for the games. In its capacity as such, it is provid-ing LAOOC with 22 private branch exchanges (PBX), 7,500 telephone sets and an electronic messaging system with 2,000 terminals and print ers, driven by a bank of 12 mini-

computers. AT&T's investment in the 1984 Olympics has been substantial so substantial, in fact, that the cost of providing communica-tions in the form of a temporary voice system and an electronic messaging system is much more than AT&T's minimum obligation of \$4 million. The millions of dollars, of course, are in addition to the 60-hour work weeks, the hundreds of AT&T employees temporarily displaced from their families and the logistical nightmares that come from a project of such magnitude.

Still, people at AT&T consider

the expense in terms of both dol-lars and sheer sweat worth every penny. In the view of many AT&T officials, the Olympics could not have come at a more auspicious time: The sponsorship represents a golden opportunity to showcase AT&T's new image as not merely a telephone company, but as an outfit with the technological wherewithal to equip the 1984 Summer Olympics with its every telecommunications need.

AT&T's first foray into the potentially burgeoning technology of electronic mail.

And while AT&T insists that the messaging system is custom-tailored to the Olympics and therefore not suitable for future marketing, the company also admits that as a protocol, the system will be useful in developing products for the general market. So if the timing of the 1984

Olympics has been anything for

AT&T's investment in the Olympics before divestiture included a \$1-million commitment from each of four divisions -Lines, Pacific Bell, the Yellow Pages and Western Electric — since Jan. 1, 1984, the financial landscape has developed much

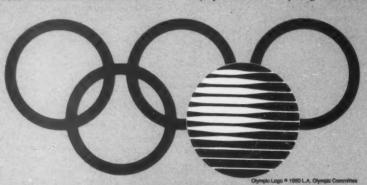
more mountainous terrain.

Pacific Bell, of course, is no longer in the AT&T scheme of things, and the Yellow Pages, now the domain of the local op-

erating companies, dropped its part of the sponsorship completely. When AT&T began work on the messaging system, it brought its Teletype Corp. subsidiary in to supply the terminals. Regulations that did not exist be-fore the AT&T breakup have now proven to be costly impediments to the implementation of the voice network. For instance, rather than simply placing its PBXs in Pacific Bell trailers at venue locations, AT&T must pay to lease space in the trailers.

Some AT&T employees have estimated that the changes resulting from divestiture, along with the usual host of unforeseen expenses, have swollen the cost to nearly five times that of the original \$4-million investment.

But McQuarrie is unfazed by the wrench that the breakup of the wrench that the breakup of the Bell System threw into the plans. "The Olympics give AT&T an opportunity to demonstrate our technological capability," he said. "This is the AT&T company. We're not a fly-by-night operation. Do you ever pick up the phone and think it won't work? It never enters your mind. Cars don't work. Toasters don't work. But the phone always works."



"Of course we're biased, but we think the Olympics are very fortunate," said Joseph McQuar-rie, who is in charge of the Olym-pics Special Project for AT&T. The company that gave the U.S. the best communications system in the world is using that same technology to put together this

temporary system."
AT&T's gift to the Summer
Games breaks down into two categories, the voice system and the electronic messaging system. According to McQuarrie, the voice system is to be the largest tempoary telecommunications net-work ever employed, and the electronic messaging system is the former monolith, it has been opportune. AT&T has splashed its logo throughout the Los Angeles metropolitan area, with AT&T faceplates on every telephone and terminal, as well as the computers and PBXs that drive the

In McQuarrie's estimation, the effect of the AT&T divestiture has been "nill" on the company's Olympics sponsorship. we would provide IAOOC with the capability to communicate from venue to venue during the Olympics, and nothing has changed," he said.

Nothing, perhaps, except the financing of the games. While

(Continued from Page 50)
Telephone of California be strict arrangements, whenever business is done, contracts must be drawn up. AT&T must now pay Pacific Bell and General Telephone for any service or goods received and vice

"We have to be very careful that we don't do anything in conflict with the court orders of divesti-ture," Peltier noted. "Seeing as they were going to be there to lay conduits, we thought we'd have them run our cable if we provided

"It is a great idea at a hell of a cost savings. But that is seen as collusion. So we are paying Pacif-ic Bell and General Telephone to provide us with cabling where we need it," Peltier continued.

We always have to make sure we have a contract every time we get something from Pacific Bell or they get something from us," Fox

There has to be a contract issued. The same goes for General

Telephone," he continued.
As July 28 approaches, timing and cooperation become more critical. Ask anyone working on the installation of the system his nerves are holding up and the answer is invariably optimism tinged with anxiety.

Keeping the project on schedule is a constant pressure," according to Motley of the Denver plant. "I'll admit I've felt some anxious moments in the last year as I realize the magnitude and responsibility of the project, but that just gets my adrenaline flowing,' he said.

"The closer we get, the more we have to explore those little nooks and crannies that crop up every day," explained Ray Adams, who is in charge of cable installation. "There are a zillion details to worry about.'

"It will work. The system will work," asserted Joseph McQuar-rie, who is in charge of the Olympics Special Project for AT&T. "After all, this is the AT&T company you're talking about."



Fred Valles of AT&T Technologies in a Facilities Trailer

Special Section: The Olympics

MESSAGE MOVING

By Katherine Hafner

The Los Angeles Olympics Organizing Committee (LAOOC) building is a large, beige nondescript affair in Marina Del Rey that used to serve as an aircraft hangar. Reaching the building is an event in itself, a voyage that takes the unsuspecting traveler through a maze of palm-lined, one-way alleys before coming upon the unobtrusive exterior of the LAOOC headquarters, where there is no clue to the activity inside.

Hafner is senior writer for Computerworld On Communications.

Message Moving

Once a visitor makes his way past an unrelenting security search and enters the guts of the building, he can see that the 1984 Summer Olympics are already in action: Coca Cola machines every five yards dispensing free soft drinks are rivaled in their ubiquity only by the red, white and blue Olympics telephones being furnished by AT&T. In short, one visit to the LAOOC headquarters makes the enormity of this summer's games evident.

At the 1976 Summer Olympics in Montreal, messengers on bicycles pedaled from place to place to deliver messages by band. If that system were used for the 1984 Summer Games, it would require either messengers with gargantuan quadriceps or bundreds of Honda 1200s.

which was then accepted by the organizing committee. "We're giving them a tailor-made software program for the Olympics," McQuarrie said. "That is not to be confused with an office automation system. Appropriately enough, AT&T has dubbed technol-

ogy "the 24th event."
"It's true if you think about it," McQuarrie said.
"I think anyone would agree that there would be no possible way to have an orderly Summer Olympics without this electronic messaging system.'

Bringing order to the Olympics in the form of the electronic messaging system involves setting up a network of 1,700 Tele-type Corp. Model 5410

ESS CONSPICUous but just as prevalent an element of the 1984 Summer Olympics is the electronic messaging be system to used for the duration of the games. At the 1976 Summer Olympics in Montreal, messengers on bicycles pedaled from place to place to deliver messages by hand. If that system were used for the 4,500 square miles that comprise the 1984 Summer Games in Los Angeles, it would require either messengers with gargantuan quadri-ceps or hundreds of of Honda 1200s.

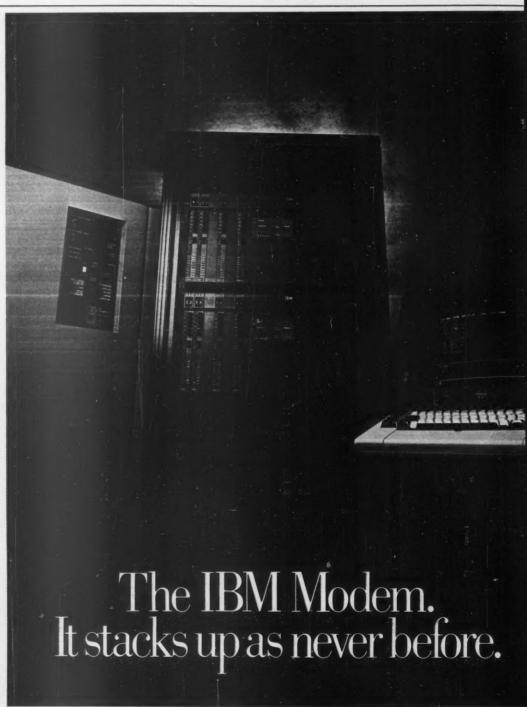
In its capacity as the official telecommunications sponsor of the 1984 Summer Olympics in Los Angeles, AT&T has spent more than a year developing an electronic messaging system for the Olym-

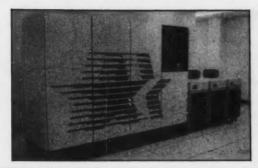
This system will give coaches, athletes, report-ers and game officials the ability to inquire about results or biographical information, communicate with one another and write and transmit news stories

Given that the Los Ange les Olympics are neither federally nor locally financed, the city of Los Angeles decided not to construct a separate Olympics facility and to rely instead existing buildings spread throughout the

greater Los Angeles area.
"To cover the 4,500 square-mile area of the Olympics, communications became very impor-tant," Joseph McQuarrie, AT&T's manager of special projects for the Olympics, said. "The LAOCC came to us and asked if there was anything we could do to help them out. So we turned Bell Laboratories loose on developing the electronic messaging system.

November 1982, approached the November In T&TA LAOOC with a proposal for the messaging system,





video display terminals, 300 Teletype printers, 168 Infotron Systems Corp. 790-Series network concentrators, as well as a bank of Infotron statistical multiplexers, all configured around 12 AT&T Technologies, Inc. 32-bit 3B 208 minicomputers.

In light of AT&T's recent entry into the computer market, with the 3B 20S among the products introduced, AT&T's use of the 3B 20S computers in the electronic messaging system marks an ideal bit of exposure for the machines. "There's a very unique opportunity here for AT&T to showcase its technologies and applications before an international and domestic audience," Bill Hightower, AT&T vice-president, Olympic Project Coordinator, said. The 3B 20S, shown on the the left, sports the red, white and blue Olympics logo, the

ubiquitous "star in mo-

Terminals will be placed strategically throughout the different venues at the Olympics, with more terminals at sites where there is the most traffic. The International Broadcast Center (IBC), for instance, ABC's center for broadcast media, will house 100 terminals.

"Places like the IBC and the press center in the Los Angeles Convention Center or wherever the load is heaviest would have the greatest concentration of terminals," Bob Katzeff, a spokesman for the project, said. "For instance, I'm sure track-and-field would have a lot more than the shooting event."

The electronic messaging system, which will operate 24 hours a day, is expected to produce results on the screen within 55 seconds of when they are

"Tbere's a very unique opportunity bere for AT&T to sbowcase its technologies and applications before an international and domestic audience," Bill Hightower said.

validated. The response time from the system is estimated at between one and five seconds, depending on the amount of system use, as well as the type of transaction being performed. And transmission speeds will vary from 9.6K bit/sec.

The menu-driven system, which presents choices in both English and French, requires no prior technical knowledge to learn how to use, according to Walt Corwin, supervisor of the Olympics electronic messaging system development. "You can imagine what it would be like to have 50,000 people who needed several hours of training," Corwin said. "That would be a tremendous training load."

According to Corwin, Bell Laboratories worked closely with AT&T Technologies to develop a

The rack-mounted IBM 3868 Modem saves you space. And money And effort.

Space, because IBM's one-inch-wide vertical package allows you to mount up to 12 modems in one enclosure that fits a standard 19-inch rack.

Money, because each enclosure needs only one power supply and cooling system to support all of its modems.

And you manage your network with less effort because the IBM 3868 Modem has the same high availability and rock-steady reliability as other modems in the 386X Series—plus

an enhanced Link Problem Determination Aid (LPDA). Working with software available for many IBM host systems, the LPDA performs greater end-to-end

management. Now line conditions are identified further downstream from the host, and in more detail. For example, conditions in any multipoint circuit can be pinpointed to a particular leg, including tailed configurations off multiplexed links.

In fact, to help you keep your network humming, the LPDA and host software monitor and provide you with a line quality value, a receive signal level, an error-to-traffic ratio and modem self-test results to help you isolate line problems. Now you can communicate them more precisely to your communications carrier.

And because 3868 Modems are so reliable, they're backed by a full three-year warranty.

Try them for up to four weeks: just select 2400, 4800 or 9600 bps line speeds. If you purchase in quantity, discounts are available.

| DRM, Dept. BO/90 | DRM, DEPT.

Ask your IBM representative for more information. For a free brochure, or to have an IBM representative contact you, call toll free 1 800 IBM-2468, Ext. 90, or return the coupon.

Message Moving

training strategy. "We got their feedback on what kind of functionality is easy to train, how you implement functionality so that it is easy for people to understand," Corwin pointed out. "That close coupling goes a long way toward making the system pretty much self-teaching and self-training. We have found that a person sitting down with the system is comfortable enough in a couple of minutes to use

"With 50,000 users, you're not going to know the ID of the people you want to send mail to. We have a data base that has all the users, and if someone types in a name that might not be spelled right, we've developed an algorithm that gives you some choices," Corwin said.

the system and explore functions he hasn't used vet."

At last summer's swim trials at the University of Southern California, the

messaging system was used for reporters, athletes and coaches to see competition results, although it could not be used for word processing. This summer's games will not only allow reporters to write their articles on the terminals, but also to send them overseas via the International Telex network.

The second portion of the Unix-based electronic messenging system includes an intelligent query system with a data base containing user names and short biographies on all the athletes. Utilizing a query system, users can obtain up-to-the-minute results of particular events, comprehensive results of the overall games, data on individual athletes and historical data on world champions and record holders.

According to Corwin, the data base is extremely flexible. "We looked at how electronic mail works on other systems and

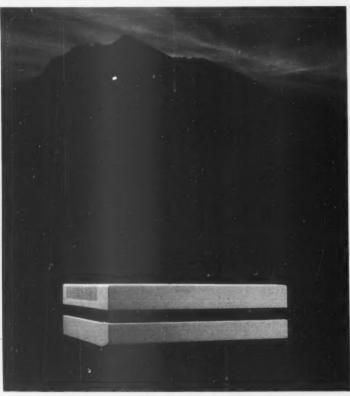


Electronic message system terminals sport the Olympics "star in motion."

blended it with the needs of the Olympics," Corwin explained. "For instance, the way you normally address electronic mail is by log-on ID. But with 50,000 users, you're not going to know the ID of the people you want to send mail to. So we have a data base that has all the users, and if someone types in a name that might not be spelled exactly right, we've developed a fairly friendly algorithm that gives you some choices.

"For instance," Corwin continued, "you might look up Smith and not quite know the first name. So you'll get back every Smith with some information about each one, who they are affiliated with, whether they are an athlete and so on. So you can choose which of the Smiths you want to send your message to."

The Teletype terminals will also feature continual electronic billboards, displaying results, calls for press conferences and individual messages. According to Corwin, the idea for the electronic bulletin boards came during the use of the electronic messaging system at last summer's swimming trials.



Now, a major advancement in Net/One local area networking. Lower cost.

Our new VLSI chip set has allowed us to do with one printed circuit board what we used to do in three. The result is a new Network Interface Unit, the NIU 150, that's half the cost of its predecessor, the NIU-1. In areas where a smaller number of either broadband or baseband connections are required, the pared-down NIU 150 brings per-port connection costs well below \$500.

connection costs well below \$500.
Streamlined NIU 150's mean more flexibility, too, by serving small equipment clusters in more diverse locations at a lower cost.

Like our other Network Interface Units, the new NIU 150 is equipped, off the shelf, to support most industry-standard equipment interfaces. And like our other NIU's it comes with complete network services software. It's also programmable, so special interface protocols can be added now or anytime in the future to support special equipment.

The broadband version of our new NIU 150 has an integral modern. Both baseband and broadband NIU 150's can accommodate up to six ports for device attachment.

Give us a call, or write for more information about turning the equipment you have now whatever it is—into the network you need now, at a lower cost than was possible before.

Ungermann-Bass, Inc., 2560 Mission College Boulevard, Santa Clara, California 95050. Telephone (408) 496-0111.

Net/One from Ungermann-Bass

© 1983 Ungermann-Bass, Inc. Net/One is a registered trademark of Ungermann-Bass. "We were getting valuable feedback last summer as far as what people could cope with and what other kinds of functionality they might need," Corwin maintained.

"Some of the press people were saying they needed a way to communicate with all of their colleagues, much like a bulletin board, where you can stick up a message saying, 'Our team is going to have their athletes available

Of course, the reliability of the system is yet to be proven, and while simulation at the swimming trials proved belpful, the real proof will come in July, when it is conceivable, but unlikely, that 50,000 people could try to log on to the system simultaneously.

at such and such a time for a press conference,'" he explained. "So what we came up with was

"So what we came up with was something a bit more sophisticated than a regular bulletin board where just anyone can stick up a message," he continued.

T FIRST, CORWIN said, the bulletin board was to be just for the use of the press people, "but then we talked to the Olympics organizing people, and they thought it would address a lot of their needs as well. Now we are to the point where there will be 900 distinct message boards. Of course, each person would only need access to four or five of them," he explained.

Different people have different access levels on the electronic messaging system, Corwin said. "Certain people might be able to write to the message board, and a larger group might be able to read it. A few select people might be able to delete messages to keep it organized and updated," Corwin explained.

At the data center in downtown Los Angeles, where the 12 3B 20S minis are located, the system is interconnected through 3B Net, which Clare Wherley, AT&T's manager of special projects operations, described as a nonswitched packet local-area network that can cover up to a mile.

Of course, the reliability of the system is yet to be proven, and while simulation at the swimming trials proved helpful, the real proof will come in July, when it is

conceivable, but unlikely, that 50,000 people could try to log on to the system simultaneously.

And if the system is a resounding success, setting a precedent for future Olympics and other major sporting events, AT&T will be able to place a fine feather in its newly divested cap. AT&T officials are as yet uncertain of the marketing prospects for a system that took more than a year and about a dozen Bell Labs engineers to develop.

to develop.

"You do have a custom-designed system for the Olympics, but its components are all commercially available," Katzeff said.
"The electronic messaging system per se may eventually be utilized. It will really depend on the need and the customer."



Joseph McQuarrie, AT&T's manager of special projects for the Olympics

Nearly Nine Million Computer-Involved People Around the World Rely on Our Publications For the News They Need.



We're CW Communications/Inc.; the world's largest publisher of computer-related newspapers and magazines. And wherever you go in the computer world, you'll find computer-involved professionals reading — and relying on—our publications. With highly trained and experienced editorial staffs all over the world, our publications give readers the best and most up-to-date information available in this rapidly changing industry.

Around the world:

We publish, co-publish or provide editorial services to the leading computer publications in the world, including publications in all of the following countries:

Scandinavia — Denmark, Sweden, Norway Finland Wortern Furgrey, West Cormony, United

Western Europe—West Germany, United Kingdom, France, Italy, Spain, Greece, the Netherlands.

The Mid-East—Kuwait, Saudi Arabia. Asia/Africa—People's Republic of China, Korea, Japan, Singapore, Southeast Asia, South Africa, India. The Southern Pacific—Australia.

The Southern Pacific—Australia. Central and South America—Mexico, Brazil, Argentina, Chile.

In the United States:

In the world's largest computer market, we publish a whole series of publications that cover different aspects of the industry. Our largest publication, with more than half-a-million readers every week, is Computerworld, a weekly newspaper aimed primarily at larger computer users. Its companion publications include Computerworld Office Automation, Computerworld of Guides Covering all major segments of the industry.

In addition, we publish MICRO MARKETWORLD for dealers, distributors, retailers and others involved in the microcomputer marketylace. For microcomputer users, we publish

Infoworld, Microcomputing, PC World, MacWorld, jr, 80 Micro, inCider, Run, and

No one in the world publishes more computer information for more people in more countries than we do. And we'd be happy to give you more information on any of our publications. Just send a telex to our U.S. offices, attention CW International Marketing Services, (telex #95-1153) or write us at the address below.



CW COMMUNICATIONS/INC.
375 Cochituate Road, Box 880, Framingham, MA 01701
(617) 879-0700

IF YOU MISS CW ON COMMUNICATIONS IN THE NEXT THREE MONTHS, LOOK AT THE ISSUES YOU'LL BE MISSING.



JUNE.

Bypass. Bypassing the local loops provided by the Bell Operating Companies has become rampant with the availability of alternative technologies. See what this means to both big, regional operating conglomerates and smaller, non-Bell Operating Companies—all in the June issue. Closes May 4.

On Communications is ideal both for the advertiser and the reader. Because each one offers focused, in-depth information on areas of interest within communications.

Readers always want to catch up on what's hot and what's not in their particular



JULY.

AT&T update. Who are the winners and who are the losers after more than six months of deregulation? Closes June 1.



This issue will look at various teleconferencing technologies—including full motion video, freeze frame, electronic blackboards and computer conferencing. The cost-effectiveness of teleconferencing technology will be examined, plus information on private and public facilities—all in the August issue. Closes June 29.

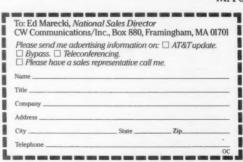
For more information, or to reserve your space in any of our upcoming issues, simply call the sales office nearest you. Or fill out and return the coupon to Ed Marecki, National Sales Director, Computerworld, 375 Cochituate Road, Box 880, Framingham, MA 01701.

specialty. And find out what the vendors have to offer.

As an advertiser, you won't want to miss the opportunity to tell them.

Maybe that's why our On Communications is becoming more popular every day.

Because everyone wins.





Sales offices

BOSTON: 375 Cochituate Road, Box 880, Framingham, MA 01701 (617) 879-0700; CHICAGO: 2600 South River Road, Suite 304, Des Plaines, IL 60018 (312) 827-4433; NEW YORK: Paramus Plaza J. 140 Route 17 North, Paramus, NJ 07652 (201) 957-1350; ATLANTA: 1833 Peeler Road, Suite D, Atlanta, GA 30338 (404) 394-0758; SAN FRANCISCO: 300 Broadway, Suite 20, San Francisco, CA 94133 (415) 421-7330; LOS AMGELES: 18008 Sky Park Circle, Suite 260, Irvine, CA 950, Irvine, CA 970, Park Circle, Suite 260, Park

Continue to receive



every month!

V. Please indicate the a organization, include

A. Under 500 B. 500 - 1,000 C. Over 1,000



the monthly news magazine devoted to the broadest coverage of the fastchanging world of communications will soon be available only to a limit-

ed number of qualified communications professionals.

Fill in your name and address.

Computerworld On Communications.

On Communications is specifically for communications professionals, whether your interest is technical commercial, services

To continue to receive *Computerworld On Communications*, just complete the attached FREE Subscription Request Form. Your complimentary subscription will continue to be FREE, but only if you let us know that you are a qualified subscriber. Simply indicate your areas of interest and involvement in communications, sign and date the form and drop it in the mail. We pay the postage.

or consumer-oriented. Straightforward and easy-to-read, On Communications offers fresh perspectives, provocative articles and interviews that keep you on top of what's happening in your areas of interest.	Don't miss a single issue of the publication that keeps you on top of an industry in the midst of unprecedented change! Send in the attached form today!
FREE SUBSCRIPTION REQUEST FORM	First Middle Last Initial Name
Free subscriptions will be accepted only from individuals in the U.S.	Your Tible
and Canada with active professional or managerial responsibilities in	Company Name
communications. Publisher reserves the right to limit the number of free subscriptions accepted in any business category. To qualify, you	Address
must answer all of the questions below completely, sign and date this form. Then just drop the card in the mail; no postage necessary.	City State Zip Code
	Address shown is: Business Home
Signature	III. Which of the following best describes year indestry? (circle one early) Manufacture (other than computer/ communications) Finance/Insurance/Real Estate Medicine/Law/Education Medicine/Law/Local Medicine/Law/Education Medicine/Law/Educa
FREE SUBSCRIPTION REQUEST FORM	First Middle Last Initial Initial Name
Free subscriptions will be accepted only from individuals in the U.S.	Title
and Canada with active professional or managerial responsibilities in communications. Publisher reserves the right to limit the number of	Company Name
free subscriptions accepted in any business category. To qualify, you must answer all of the questions below completely, sign and date this	Address State Zip
form. Then just drop the card in the mail; no postage necessary.	Code Code
I wish to receive a free subscription to On Communications Yes No Signature Date Date Please indicate your communications and industry involvement by circling the appropriate choices for each section. HOW TO GET YOUR FREE SUBSCRIPTION:	Address shown is: Business Home I. Which at the fallowing bast describes year industry? (circle one only) 10. Manufacturer (other than computer/communications) 20. Finance/Insurance/Real Estate 30. Medicine/Law/Education 40. Wholesale/Retail Trade 50. Business/Computer Services 60. Government - State/Federal/Local 65. Public Utility/Communication System/Transportation 70. Mining/Construction/Petroleum/Ref. 53. Other (please specify) 14. Which at the fallowing bast describes year arganization is involved in stitutional end user of commication systems and equipment (including alindustries and businesses) B. Government - Federal/State/Local (including mailitary) Communication System/service (including common carriers, telephone companies, utilities and broadcasting) E. Systems integrators, Systems and Software Houses, Service Bureaus and Consultants F. Other (please specify) 10. Comporate Management, Planning, Development 20. Communication System Management, Planning, Development 21. Communication System Management, Planning, Development 22. Communication System Implementation & Operation



FREE To Qualified Subscribers.

Send in Your Card, Today!



BUSINESS REPLY MAIL T CLASS PERMIT NO. 866 FRAMINGHAM, MA 01701

Postage will be paid by addressee

COMPUTERWORLD ON COMMUNICATIONS

375 Cochituate Road Box 897 Framingham, Mass. 01701

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES



BUSINESS REPLY MAIL ST CLASS PERMIT NO. 866 FRAMINGHAM, MA 01701

Postage will be paid by addressee

COMPUTERWORLD ON COMMUNICATIONS

375 Cochituate Road Box 897 Framingham, Mass. 01701

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES



Special Section: The Olympics

THE GLASS BACKBONE

By Bruce Hoard

The Summer Games of the 23rd Olympiad in Los Angeles July 28 to Aug. 12 are The Olympics of Big Numbers and High Technology. They are expected to be watched by 2.5 billion television viewers — roughly half the world's population — attended in person by 2.5 million spectators and covered by 15,000 journalists. The 23 events will take place over a 4,500-square-mile area with 190 miles separating the northernmost venue (Lake ▶

Hoard is editor of Computerworld On Communications.

Casitas, site of the rowing competition near Santa Barbara) from the southern periphery (the equestrian endurance venue at Fairbanks Country Club near San Diego).

It all adds up to one of the most formidable communications challenges in history for ABC, which owns the national and international broadcast rights to the games. ABC bid \$225 million to broadcast 187 hours over 16

ABC bid \$225 million to broadcast 187 bours over 16 days. The network bas put 2,500 employees, 144 studio cameras, 64 bandbeld cameras, three bouseboats and five belicopters to work on the project.

days. The network has put 2,500 employees, 144 studio cameras, 64 handheld

cameras, three houseboats and five helicopters to work on the project. And

foreign broadcasters receiving the ABC feed are expected to broadcast a total of 1,300 combined

ND ABC also paid approximately \$5 million to the obtain right to utilize a digital, laser-powered, lightwave

fiber-optic network built and owned jointly by Pacific Bell and General Telephone of California. Planned to link over 250 central offices serve two-thirds of California by 1986, the incipient network will offer 300 miles of cable for Olympics coverage this summer. Each of its ½-in. cables is capable of carrying as many circuits as 100 3½-in. copper cables at speeds up to 90M bit/sec. At the Olympics, it will also move data around AT&T's electronic messaging system (see story on Page 55).

By this summer, the network is expected to con-nect most of the AT&T 1A ESS and 4 ESS electronic switching systems in the Los Angeles area. Those switches are capable of handling 295,000 and 550,000 busy-hour calls,

respectively.
Definitely the Olympics of Big Numbers.

OHN Johnson, who is Pacific Telephone's marketing n ger for manathe 1984 Olympics, explained how fiber optics and the Olympics were brought together. Johnson has been working on the project since May 1979, and he was chairman of the Glen

Campbell Los Angeles Open from 1977 to 1978. He said that when it be-gan to look as though Los Angeles would be the site of the 1984 Summer Games, the networking planning people at what was then Pacific Telewas then Pacific Tele-phone started thinking about how the operating company could serve company

them

Bell Canada was can-vassed to see how it had dealt with the 1976 Sumdealt with the 1976 Summer Games, and it was decided that fiber optics would be appropriate. Although the fiber-optic cable was not installed until 1982, the network itself had been planned for years, Johnson pointed out. "The radio spectrum here in Los Angeles is out here in Los Angeles is out



5 Day Delivery!

Paradyne 2,400, 4,800, 9,600 BPS CHALLENGER Modems

Call 1-800-482-3333

and Paradyne will send your modems COD to be delivered at your site, anywhere in the continental U.S., within just 5 days! Paradyne's CHALLENGER Series high performance modems are state-of-the-art technology using advanced signal processing techniques.

Installation Is Fast and Easy. You can install these modems yourself! Plug in the modem, follow a push button configuration procedure, attach your DTE connection and the modular jack, connecting the modern to your 4-wire leased phone line. You're ready to go!

High Performance Backed With Paradyne Reliability. All three models operate in either point-to-point or multipoint applications. An optional four-port buffered multiplexer is available for the 4800 and 9600 models. And the Series has a calculated mean time between failure of more than four years



Prices include freight and COD charges.

State-Of-The-Art VLSI Technology. Front panel soft strapping configuration is easy and each modern has automatic, adaptive equalization at all speeds, including 2,400 bps.

If You Need Moderns NOW, Order Direct From The Manufacturer -Call 1-800-482-3333 or mail in your order. In Florida please call 813-530-2516. Delivery time and price discounts for large quantities available on request. Multiplexer option available at additional cost. Dealer inquiries invited. The new CHALLENGER Series...a challenge to the modem industry offering quick delivery at prices below what you normally would expect to pay...only from Paradyne.

1,200 BPS Modem. Also available for 5 day delivery is the DTU 1200D, a 212A compatible full duplex dial modem. This 1,200/300 bps modem features automatic dialing, CRT prompts and automatic test capabilities and sells for \$655 including freight and COD charges

paradyne

Paradyne Corporation P.O. Box 1347 8550 Ulmerton Road, Largo, FL 33540

of gas — it was in 1976 — and to have 130 simultaneous shots to an international broadcast center was not in our capacity to do using standard technology, microwave equipment," he explained.

Pacific Telephone and ABC first

Pacific Telephone and ABC first met in November 1979 to explore the possibilities of combining for an Olympics effort. In addition to talking to the Bell Canada, Pacific Telephone representatives also went to Lake Placid, N.Y., site of the 1980 Winter Olympics, to study how coverage was conducted there. In addition, there was also a meeting with the European Broadcasting Union (EBU).

There was another trip to the 1980 Republican National Convention in Detroit to see how ABC handled it. "We just looked at their total approach," Johnson said.

"How do you get in and get out? We wanted to see if there was going to be anything a little bit different," he explained.

Johnson stressed the fact that Pacific Bell's customers are not shouldering any of the costs the company incurred constructing fiber-optic facilities for the Games, some \$9.5 million in what would normally be nonrecoverable costs. Olympics customers such as ABC are paying off that debt, at the insistence of the California Public Utilities Commission.

RANK J. FEGER, ABC's manager for telecommunications broadcast operations and engineering for the 1984 Olympics, is overseeing the gargantuan communications operation built around the fiberoptic network. Every-thing is centered around the Hollywood-based Unilateral Broadcast Center (UBC) and the International Broadcast Center (IBC) where all the world broadcasters will be located during the games. The UBC contains ABC's Los Angeles network operations and its KABC affiliate. IBC is located just two blocks away in the middle of several ABC sound stages where various network programs are produced. The two broadcasting sites are connected via fiber-optic lines.

Almost all the venues are linked into the IBC via the fiber-

Almost all the venues are linked into the IBC via the fiber-optic network and the two telephone companies that operate it, General Telephone and Pacific Bell. General Telephone is responsible for nine venues, two media facilities, the Olympic Village in Westwood, a sub-Olympic Village in Santa Barbara, the Los Angeles Olympics Organizing Committee's (LAOOC) staffing center in Westwood and LAOCC's headquarters located in Marina del Rey.

At venue sites, General Telephone will also operate five 45-foot trailers packed with sophisticated audio, data and video transmission equipment.

Pacific Bell is responsible for 20 venues, IBC, UBC, the international, domestic and Olympic Jobnson stressed the fact that Pacific Bell's customers are not shouldering any of the costs the company incurred constructing fiber-optic facilities for the Games, some \$9.5 million in what would normally be nonrecoverable costs. Olympics customers such as ABC are paying off that debt, at the insistence of the California Public Utilities Commission.

press center, the International Olympics Committee headquarters and Olympic villages at the University of California at Santa Barbara and the University of Southern California. Pacific Bell

will operate trailers at many of the venues.

OME OF THE MORE distant venues, such as the rowing site at Lake Casitas 90 miles away and the fencing site at Long Beach, will be linked via satellite or portable microwave transmission to UBC and then run over to IBC. ABC is also setting up its own microwave links to bring in several other remote events Pacific Bell and General Telephone will not cover.

"All of this comes off spur from the backbone of the telephone companies' fiber-optic network,"



Feger explained. Each individual fiber will carry one video channel. Each video channel will be accompanied by two audio channels. Channel 1 audio will be international sound for television, including the crowd noise and the public address system. Channel 2 will have the crowd noise for the radio broad-

S HOST BROAD-caster, ABC is also responsible for making Olympics transmissions available to the entire world. But responsibility that ends once the broadcast is assembled in Los Angeles at IBC. From there, foreign broadcasters will have to transmit via their own facilities

An example of that is the EBU. An example of that is the EBU, based in Geneva, Switzerland. It commissioned Netcom Enterprises and AT&T Communications to supply live and taped coverage to 35 member networks in 30 European countries. Netcom and AT&T will use a combination of terrestrial and examiliate activities. of terrestrial and satellite facilities to provide coverage via their two

international gateway cities, Etam, W. Va., and Andover, Maine.

Once the signals have been received in Los Angeles for the do-mestic feed, they will be fed back to ABC New York via a Telstar satellite, where commercials will be inserted, and from New York out onto the national network and into the homes of viewers

Feger explained that there are many support facilities such as private lines, audio lines and even a "Roone Arledge phone," which will ring automatically at IBC when ABC News and Sports President Roone Arledge picks it up at

In addition, approximately 20 of the major venues will have nu-merous support trucks and trailers at hand. Walking through one of the transmission trailers is like taking a tour of a miniature central office switching station. Lloyd G.

Walking through one of the transmission trailers is like taking a tour of a miniature central office switching station. Lloyd G. Carter, a member of General Telephone's administrative staff wbo bas been spearbeading the development of its support, said the trailers are using existing equipment. "The only thing we did was put it on wbeels," Carter explained.

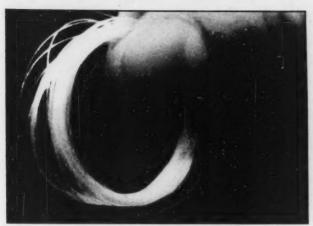
opment of its support, said the trailers are using existing equip-ment. "The only thing we did was Carter, a member of General Telephone's administrative staff who has been spearheading the develput it on wheels," Carter explained.

HE SIMILARITIES BEtween the trailer and the central office begin in the battery room. Like a central of-fice, the trailer has its own battery power, which allows it to transmit even if there is a general electrical power failure. AC power is used to charge the batteries and run the video test monitor equipment, which is stacked, monitor upon monitor.

The trailers, which cost approximately \$500,000 each to produce minus labor, also contain facilities



You can deal either with all of these companies for a total communications system...



for transmitting data, private line telephone, telex and radio. Just to make sure things stay cool, there are two four-ton air conditioners. "All the communications requirements we normally have in the network, we can do here," Carter said.

"It really is a small central office. The only thing we don't do is switch," he explained.

During the games, the video signal will be originated in an ABC camera in analog form and sent to the trailer via coaxial cable. From there, it will wind its way through monitoring equipment and be converted through a digital television lightwave system in the trailer. The digital light pulses are then fed into a fiber-optic spur outside the trailer

at 90M bit/sec to the IBC and another digital television lightwave system where they will be reconverted to analog.

HIS MAY SEEM SIMple to the millions of Olympics viewers who simply turn on their television sets at home, but the project required hefty negotiations. Feger said the AT&T divestiture made it difficult to figure out which company or companies — among them Pacific Bell, AT&T Technologies, Inc. or AT&T Information Systems — will provide these services. Feger said he was certain that General Telephone would provide services because it was not divested.

He did not recall negotiations with General Telephone and Pacific Bell fondly. "We had a lot of

Were it not for the fiber network, the broadcaster would bave bad to rely on extensive microwave coverage. wbich is a problem in an area already clogged with as many microwave frequencies as Los Angeles. "It would bave been a problem to do it all at the same time," Feger said.

problems with the costs from the telephone companies and were looking at other ways to provide the facilities, but in negotiations, we finally met at a point of agreement." he said.

"For my part, which is telecommunications, video and the support facilities for the telephones and private lines, I think it will be close to \$5 million. And if you think of manpower, lodging and traveling from the East Coast for all the engineers, it is a lot more," he said.

Nevertheless, the fiber-optic network is the key to making the 1984 Olympics doable for ABC. Were it not for the fiber network, the broadcaster would have had to rely on extensive microwave coverage, which is a problem in an area already clogged with as many

erage, which is a problem in an area already clogged with as many microwave frequencies as Los Angeles. "It would have been a problem to do it all at the same time," Feger said.

Feger, who has been working on ABC's Olympic coverage since 1982, summed up the entire project like this: "It is just an immense job."



or all of these.

A simple enough choice.

After all, when it comes to building a national, regional, or local communications system, what you don't need is a lot of different companies to contend with.

Now all you have to deal with is one. GTE.

We're the company with the capability to satisfy all your communications needs.

GTE offers modular digital PABX systems for both voice and data transmission. We can program your system to deliver the service you need, and also provide products ranging from electronic feature phones to executive workstations with video capability.

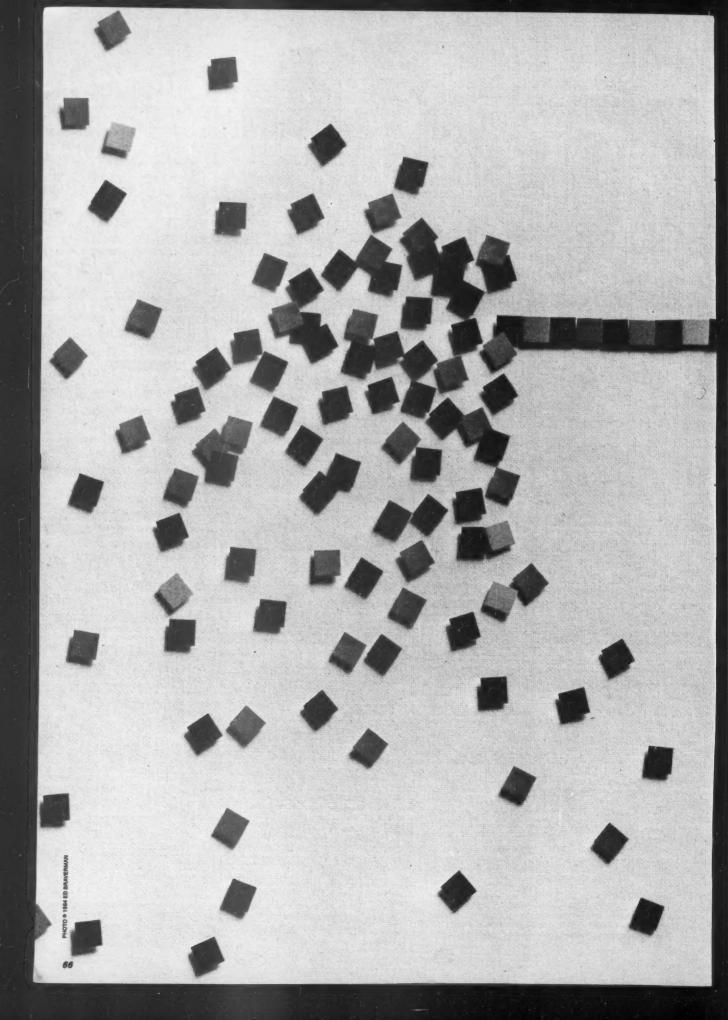
Outside and beyond your own offices, GTE can meet your communications needs with the Telenet public data network, Telemail electronic mail, and even satellite communications from GTE Satellite Corporation.

We have a staff that's available to analyze your needs and design a major communications system for your facilities. We can even help with financing. And we have one of the finest field orga-

nizations in the business providing after-sales service.

You see, our business is designed to give your business improved productivity and better management control. For more information write to Marketing Services, GTE Business Communication Systems Incorporated, 12502 Sunrise Valley Drive, Reston, VA 22096. In Canada, AEL Microtel Limited, 1211 Denison St., Markham, Ontario L3R 4BS.

We've simplified a complicated business.



MUX ADO ARGU MINTIPLEXERS

BY LEE SUDAN

The data communications industry started out simply with the requirement of accessing data processing resources from remote locations. This set the stage for the evolution of the basic data communications component — the modem. Next came the need to share the modem bandwidth among multiple users, which resulted in the development of multiplexers. The multiplexers started out with basic frequency division multiplexing techniques (see sidebar on Page 70), evolved into time division multiplexing and finally matured into statistical-based time division multiplexing and packet-switching-based networking nodes.

The market dynamics responsible for the multiplexer metamorphosis are still alive today. Technological advancements and the accelerated pace of changes in the regulatory, data processing and telecommunications environment are creating new ground rules for transition of multiplexer networks. As a result, no single multiplexer technology can adequately handle the growing needs of

the user community.

As networks have evolved, the user has gone from a simple single-host configuration to several multivendor hosts with multiple geographically dispersed locations accessing the host resources (see Figure 1 on Page 69). These complex configurations create the need for sophisticated management and control techniques and the deployment of powerful and highly functional networking nodes. They also make it necessary to increase the cost effectiveness of these systems.

Sudan is director, network products, Codex Corp., Mansfield, Mass.

Multiplexers

In addition, data communications costs have been steadily increasing in the past few years, making cost-effective solutions even more crucial. By the end of this decade, it is expected that data communications will account for 20% to 25% of total data processing expenses. As a result, it has become important for data communications users and vendors to optimize data communications solutions and

The past two to three years have seen an onslaught of significant changes in the communications environment. Perhaps the most important of these changes is the AT&T divestiture, which has created new transmission services and associated tariff structures.

keep abreast of market changes shaping the future of these networks. The past two to three years have seen an on-slaught of significant cations environment. Perslaught

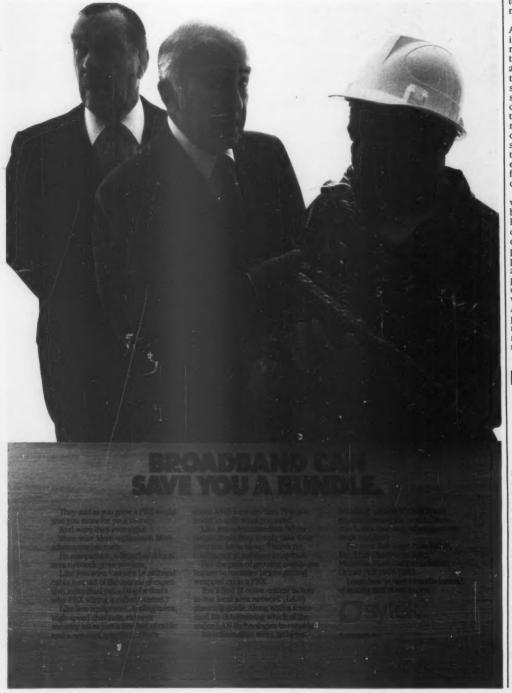
these changes is the AT&T divestiture, which has created new transmission services and associated tariff structures. The impact of the divestiture will be felt for years to come as new affordable higher bandwidth facilities such as the terrestrial digital services, satellite digital circuits and improvements in digital data services are introduced. In addition, the value-added networks provided by the telephone companies will provide alternatives for users networking needs.

These new directions of AT&T and the evolution of integrated service digital networks (ISDN) signal trends of digitization and availability of cost-effective bandwidths capable of speeds up to 1.544M bit/sec. The result of these changes will be the evolution of newer generation multiplexer networks combining voice, data, facsimile, electronic mail, teleconferencing, computer-aided design and manufacturing and graphics data.

Network designs, whether multiplexerbased or otherwise, are heavily influenced by the changes in the data propast, the majority of the applications have been hierarchical in nature. The popularity of personal computers will impact network designs significantly. As personal computers proliferate, so will the need to manage the networking aspects of these devices.

HE DIFFERence in addressing the needs of per-sonal computers as with ordinary terminals involves the operations aspects, because micros are stand-alone processors as well. The impact on the multiplexer designs will vary, depending on the application. It may require protocol conversion; it may support high-speed data transmission; and it may require gateways to support the imbedded computer vendor architectures. In addition, the increasing emphasis of computer vendors toward communications networking architectures will also require some adjustments in the designs of future multiplexers

Another factor that is shaping the future of multiplexer networks is the



recent advancement in local-area networking, voice-data integra-tion and the communications needs of the office of the future.

Local-area networks will significantly change the complexion of future multiplexer designs. Local nets introduce their own idiosyncrasies into the design equation. Increasing functional integration trends will make it necessary for multiplexer designs to accommodate voice, facsimile and other bit-oriented and time-sensitive data streams. The office of the future may create additional demands on the network designs to handle very high speed data trans-

The evolution of ISDNs will create its own unique demands on future multiplexer designs. There will be requirements for supporting higher speed data streams, carrying bit stream data and supporting interface standards such as X.21 and others as they evolve. All the factors mentioned above

will contribute to the shaping of future multiplexer designs and

Mini STDM STDM synchronous or Synchronous Termin

Figure 2. Simple Application

networks. These changes in the environment have already impacted basic network topologies. For example, consider time division multiplexing. Until recently, time division multiplexing was facing virtual extinction in face of the new statistical time division multiplexing and packet-switching technologies.

The availability of affordable high transmission speeds such as 56K bit/sec and 1.54M bit/sec has revived the utility of this technology. It has, among other things, fueled the voice-data integration process in many corporate communications networks. In many cases, users are less concerned about the limited bandwidth constraints that had previously driven them into using the statistical time division multiplexing tech-niques. The advent of ISDNs and availability of affordable satellite bandwidth will increase the utility of time division multiplexers.

Statistical time division multi-plexing technology gained popu-larity a decade ago because it was more cost effective than concentrator alternatives and made better

use of the communications bandwidth than time division multiplexing technology. Since then, many changes have taken place in the statistical time division multiplexing world. Technological adplexing world. Technological advances in microprocessors now allow statistical time division multiplexing to be designed and used cost effectively even in such simple applications where a few terminals access a remote minicomputer (see Figure 2).

At the other extreme, user needs and technology have forced statistical time division multiplexing to evolve into higher function.

ing to evolve into higher function network processors, as shown in Figure 3 on Page 70. In this appli-cation, the network processor not only performs statistical multi-plexing but, in addition, provides

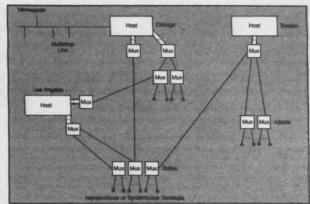


Figure 1. Accessing Computer Resources from Dispersed Locations



Multiplexers

satellite time delay compensation, performs network management, reroutes user data over alternate links in cases of link failures and congestion conditions and allows asynchronous terminal users to choose their destination hosts.

In essence, statistical time divi-sion multiplexers have evolved from a simple multiplexer into multifunction nodes. In the past separate products were required to perform these applications.

ACKET SWITCHING technology is also gaining widespread popularity in many large corporate net-works. This technology is closely associated with the CCITT X.25 standard, which incidently, is one of the reasons for its popularity. Many mainframe and minicomputer vendors are now also supporting X.25. Support of X.25 allows these hosts to be connected to many public data networks. It also generates savings on hard-ware costs because multiple physical devices can communicate via a single X.25 connection supporting multiple logical channels.

Note, however, that X.25 is an interface standard only and does

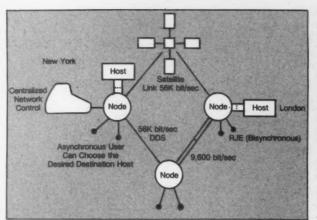


Figure 3. Multifunction multiplexing nodes combine satellite time-delay compensation for bisynchronous remote job entry and reroute user data over alternate communications links in the event of failure.

not allow incompatible devices to communicate even though they may support X.25 format. And packet switching is not a panacea for all networking solutions, especially for communications in which the data transmission is in short blocks and is time-delay sensitive. Other technologies such as time division multiplexing and statistical time division multiplexing may be better suited

for these applications and in mul-tivendor host computers environ-

All these multiplexing technologies have their own place in the fast-changing data communications environment. No one technology can fully satisfy users' burgeoning communications needs.

For example, in a hypothetical network, the time division multiplexer can combine voice, data and teleconferencing, and it can support time-delay sensitive data such as security and process control. In the hypothetical network, the statistical time division multi-plexers provide the advantages of error protection and superior bandwidth utilization using data compression and statistical multiplexing techniques. The packet nodes provide an interface to X.25 hosts and public data networks.

Change in the data processing, regulatory and telecommunications environment is constantly molding the shape of multiplexers and the networks based on them. In many cases, the only reasonable solution is a hybrid network combining all these technol-ogies. Yet, this needs to be flexible to absorb the advances in local-area networks, voice-data transmission and the computer vendor architectures. A close approximation of an ideal network will be one that transparently transports data, voice, facsimile teleconferencing and so on and provides appropriate gateways into the heterogenous computer communications environment.

Remote SDLC 3270's Appear As Local 3270's



With IBM Compatible **Channel-Attached Controller**

The Virtual Local Controller (VLC) can accommodate multiple lines while supporting all features of both dial-in and dedicated SDLC 3270s without a 3705 and without cost ly teleprocessing software. Avoid the NCP generation process. Simply generate your IBM system as if it has one or more SNA 3274 local controllers. The VLC does all the rest.

The VLC takes care of all transmission error detection and recovery. Internal diagnostics and powerful on-line trace capabilities are standard. Remote concentration and networking can be included. If desired, concurrent enhanced 270X/370X-EP emulation is available

Although attaching to either a block or byte multiplexer channel, the programmable VLC is self-loaded, independently of the host. Installation is straightforward. On-site spares make maintenance easy.

Since 1976, Lemcom Systems, Inc. has been a leading supplier of IBM compatible

Front-End Processors and custom data communications products. Over six hundred users are already benefiting from our economical and reliable solutions to their needs.

The VLC is available for purchase or under flexible lease alternatives. Talk with us about how to simplify your entry into SNA data communications. Call or write today.

> LEMCOM SYSTEMS INC

Multiplexing Methods

networking technologies are based on frequency division multiplexing, time division mul-tiplexing, statistical time divi-sion multiplexing and packet

In frequency division multi-In frequency division multi-plexing, the communications bandwidth is shared among dif-ferent users by assigning differ-ent frequencies to each user. This results in inefficient use of the bandwidth. The typical ag-gregate of all users over a Bell 3002 line is less than 1,800 bit/

The more efficient time divi-sion multiplexing assigns fixed time slots for transmission. For example, the same 3002 line can be shared among four different users, each running 2,400 bit/

Even more efficient is statisti-cal time division multiplexing, which exploits pauses and the half-duplex napauses and the half-duplex na-ture of computer communica-tions. Typically, depending on the application, terminals com-municate with the computer be-tween 5% and 40% of the time. Statistical multiplexers dynami-cally assign the high need link capacity to users as they become active. Depending on the application, it is conceivable that four users could be running at 9,600 bit/sec each as compared with 2,400 bit/sec each when using time division multiplexing. Statistical time division multiplex-ing lends itself to several other benefits such as error protection, data compression and protocol intervention.

In packet switching, the user data stream is divided and formed into individual packets that may travel independently through high-speed links to reach destination nodes which then resequence them in proper

Packet switching is usually a nontransparent operation, be-cause each segment of user data has to be packetized requiring knowledge of its format. Statistical time division multi-

plexing, on the other hand, is almost transparent because it sim-ply scans the user data and sends it to the remote nodes using variit to the remote nodes using variable-length internodal frames. The only nontransparency in this method is the 30- to 75-millisecond typical delay introduced by the nodes as a result of their forming internodal frames, error checking and data buffering.

The time division multiplexing technique is virtually trans-

The time division multiplex-ing technique is virtually trans-parent. The delay introduced ranges in 1- to 2-bit times or character times, depending on the technique. Packet switching tends to be more efficient when the terminal use is high, such as the terminal use is high, such as in remote job entry and file transfer applications. Statistical time division multiplexing usu-ally carries data from multiple users in each internodal frame and is even more efficient when terminal use is low. Efficiency is defined as the ratio of actual user data to the total data in an internodal frame. Total data in a frame includes overhead such as flags, cyclic redundancy checks, address and control information and user data.

PAGING PROGRESS

BY HELEN PETERSON



WITH RECENT DEVELOPMENTS IN PAGING DEVICES, YOU CAN RUN, BUT YOU CAN'T HIDE.

Packing for a trip? Don't forget your portable message center. You don't have one yet? You may soon find a personal message center, now commonly known as a pager, as indispensable as a watch or pocket calculator

Pagers are becoming personal

Peterson is manager, public

message delivery devices that can eliminate frustrating games of telealmost instantly, no matter where you are

course on Oct 15, 1950, and until recently doctors and other emersales and service workers have been the primary users of pagers.

But soon, the pager may be as ubiquitous as the watch or calculaphone tag and deliver information, for for several reasons. The number larger competitors are offering a vamodels to colorful pencil-slim styles one might give a child And

from primarily a locator service to a message delivery service illustrates the broad evolutionary changes in communications to meet the needs of a highly mobile, information-hungry society: We are all in a hurry and want to know now.

AGING WAS born more than 30 vears World ago. War II and the rise of the automobile culture created a need for coordinated mobile communications. The Federal Communications Commission (FCC) first allocated mobile radio frequencies in 1949. Gradually, a dual system of public provided by paging wireline common carriers (local telephone companies) and radio common carriers — and private paging developed.

More than two million pagers are in use today. Over 1.6 million of them are served by common carriers and the rest by private systems designated by the FCC for such uses as special emergency, business, public safety, industrial, land transportation and power radio.

There are more than 700 radio common carriers in the U.S., and they provide more than 85% of all public paging service. Local telephone companies, mainly the Bell companies, provide the rest.

Besides the public-private dichotomy, the paging industry has also had largely separate service and equipment sectors. Many record common carriers are family-owned local businesses, and many also operate telephone answering services as an added attraction to paging customers.

Many large firms are acquiring local paging oper-ations nationwide, which indicates the potential in the paging service business. The major paging service operators, sured by pagers in service, are Graphic Scanning, Metromedia. Inc.: Inc.: MCI Airsignal; Communications Industries, Inc.; Mobile Communications
Corp. of America; RAM
Broadcasting; and Lin
Broadcasting Corp. Leading equipment manufac-turers include Motorola, Inc.; Nippon Electric Co.; Multitone Electronics, Inc.; General Electric Co.; Panasonic Corp.; and Harris Corp.

How much has paging

Paging was born more than 30 years ago. World War II and the rise of the automobile culture created a need for coordinated mobile communications. The Federal Communications Commission first allocated mobile radio frequencies in 1949.

grown and how fast will it

In 1969, fewer than

40,000 pagers were in use. By 1979, the number was just under 900,000. By

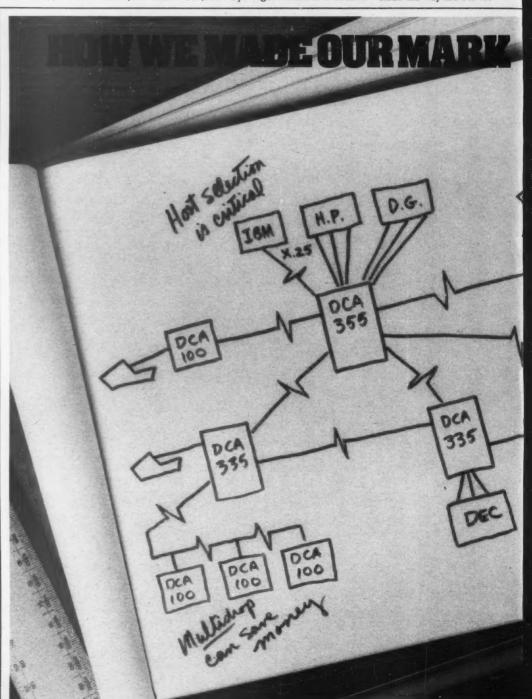
1990, the number could reach 20 million pagers, eight million to 10 million

of them served by common carriers.

In addition to allocating more frequencies for public and private uses, the FCC has authorized the use of broadcast FM subchannels for nonbroadcast commercial uses, including paging.

ing paging.

In light of these changes, paging companies are rethinking several aspects of the paging business. These aspects include the way the service



is marketed and advertised and whether to sell or lease the pager: Most units are still leased.

Meanwhile, the paging instrument itself is undergoing a radical change. The first pagers were the size of bricks and almost as heavy. The paging range was only 50 feet from a cable installation. There was no selective paging to an individual pager until 1965. As the price of until pagers dropped and tech-

The paging instrument itself is undergoing a radical change. The first pagers were the size of bricks and almost as beavy. The paging range was only 50 feet from a cable installation. There was no selective paging to an individual pager until 1965.

nology advanced, enabling voice messages and selec-tive paging, the paging industry began to grow sig- and more convenient to nificantly.

carry. They are also be-Pagers now are smarter coming highly differentiated. The colorful tone-alert pager that a parent might give a child is not suitable for the business executive who needs a numeric display or prefers a voice message

Paging technology is taking advantage of ad-vances in micro-miniaturization, whereby the entire radio receiver portion can fit on a single chip. The latest pagers also have microprocessor chips that enable them to retain messages or to notify the user silently of a call by a flashing light or to recall a numerical message on a display screen.

ASICALLY, paging system is a one-way radio system that transmits information to the being person paged. This information is received in three basic ways, representing the three most common types of pagers in use today: tone-alert or "beep" tone-and-voice and nu-

meric display.

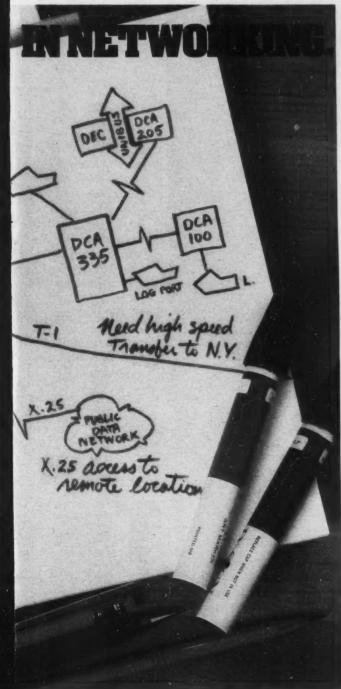
Tone-alert is the simplest and therefore the least expensive pager to rent or purchase. It also uses less air time. A paging channel can accommodate about 100,000 tone-alert compared with pagers. about 50,000 numeric display pagers and only 1,500 tone-and-voice pagers.

The tone-alert pager is primarily a locator tool, while the numeric display and tone-and-voice pagers have message delivery ca-pabilities. However, some dual-function tone-alert pagers are available that emit two different tones which, through prearrangement, can signal the user whom to call.

tone-and-voice With pagers, messages are either delivered instantly or stored and sent when air time is available. In numeric display paging, the first digital paging technique, users can devise a code to determine the purpose of a call. A caller's 10digit telephone number is displayed followed by up to 14 additional digits, which can be used to indicate the call's purpose.

Each pager is given telephone number, which the paging company obtains from the local telephone company. When that number is dialed, the pager is activated to beep, vibrate, flash a light or receive a brief voice mes-

This is a far step from the early pager, which was



At DCA, we've developed what many regard as the most efficient, most effective networking design in the industry. We call it Integrated Network Architecture. And here's what makes it work:

Complete network transparency. We make all our networking hardware to interface with all data processing hardware. So you don't have to modify your hosts or terminals

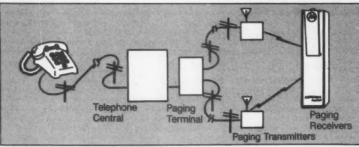
Comprehensive network management. You can monitor transmissions, troubleshoot, even reconfigure parameters on-line from one central point. With a DCA network, you have total control.

Virtual circuit switching. For optimum efficiency, our network provides accessibility for any terminal to any host

Error controlled transmission. Since we have practically erased the probability for undetected error, low-cost terminals can be used more reliably.

Compatible modular hardware. It makes our networks easy to maintain and inexpensive to expand. All you do is add—instead of replace—DCA components.

Integrated Network Architecture. Let us lay it all out for you. Write: DCA, 303 Research Drive, Norcross, Georgia 30092. Or call toll-free: 1-800-241-5793.



A Typical Paging System

simply a radio receiver that the user held up to his ear to receive a number. Recently, one company introduced a 5.6-ounce super pager with 24-character alphanumeric display that can send messages of up to 150 words nationwide.

Alphanumeric display paging is predicted to be the next big leap forward for paging, providing the true delivery and integration of words and numbers. Currently, pages can

be initiated by anyone with a push-tone telephone.

Alphanumeric pages, however, require some kind of computer terminal, either at the page requestor's location or at the central dispatch location. The cost of those terminals is still quite high — between \$300 and \$500 — and until the cost and size come down considerably, there will not be large-scale alphanumeric paging. At the present time, businesses can use alphanumeric paging through their intelligent word processing systems, executive work-stations or anything that has a computer terminal capability.

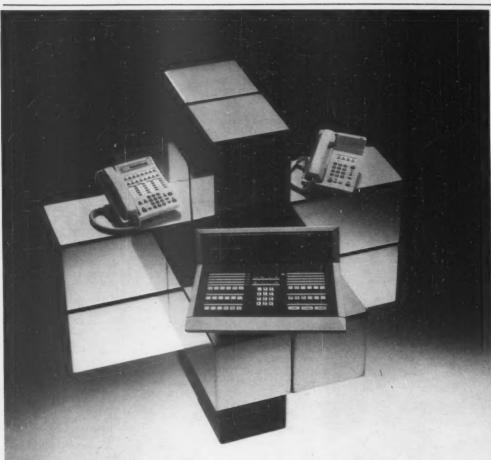
Another advance in paging, at least from the operator's viewpoint, is that the

Alphanumeric display paging is predicted to be the next big leap forward for paging, providing the true delivery and integration of words and numbers. Currently. pages can be initiated by anyone with a pusb-tone phone.

speed of signaling — how quickly a page is sent will probably increase dramatically.

Increases in the signaling speed mean each page occupies less air time, and the operator can accommodate more pages.

HE ORIGINAL paging techniques were analog: An audible tone was sent out, which activated the paging proce-dure. This was limited because only a limited number of tones could be sent out, and the number of customers on a channel was limited by the number of tone combinations that were available. Analog sig-naling also has drawbacks because it can send a false page quite easily.



The timeless machine.



It makes obsolescence obsolesce

technologies. But with the explosion in office automation, impossible demands are placed on existing communications systems. As companies evolve in size pand complexity, few of their systems can made the challenge of change. NEC's new NEAX® 2400 Information Management System (IMS) is the exception. Highly sophisticated and intelligent, it exceeds all expectations in its ability to perform now and with future developments. Start small — the core of the system is there ready to expand with you, from 184 ports to over 20,000. Begin with voice. Add data and other communications services as you need them. Increase ports. Upgrade features. Move personnel, Make additions. The unique modularity of the digital NEAX 2400 IMS makes them not only ossible, but also simple. You never

sacrifice features. You never pay for more system than you need. You never run out of capabilities because of growth or the need for increased com-

munications power.
NEAV 2400 IIMS it makes obsolescence obsolete. Make it the core of your information network. For details contact NEC Telephones, Inc. 532 Broad Hollow Road, Melville, NY 1747. Call holl-free 1-800-645-9236; In NY State 516-249-450.

NEC NEC Telephones, Inc.

NEAX 2400 IMS

State-of-the-art paging signaling is a digital technique called frequency shift keying. Further advances in the signaling rate of frequency shift keying are expected, which means that more customers can be accommodated on a channel.

HERE ARE CODING techniques that can provide up to eight million distinct customers on a radio channel. The POCSAG code, developed in the UK and becoming a standard worldwide, can provide two million customers with a multiaddress paging service — four different numbers that can activate the customer's paging device.

The FCC has authorized three new channels for nationwide paging, which has a potential market of five million users. Many of them are already paging subscribers, but most are not, precisely because paging has been a local service.

Nationwide paging will be an attractive adjunct to local paging and will not supplant it.

Currently, the geographical

Currently, the geographical range of a paging system depends on the design of the radio system, the number of transmitters, where they are located and how much power they have.

A range of 20 to 30 miles from a downtown metropolitan area is representative of the majority of systems.

There are also questions about the impact of cellular service on the paging business. Many see paging and cellular service as complementary.

For one thing, the cellular customer may not have a portable cellular phone. In that case, the customer can use a paging device to stay in touch when away from the office phone or cellular car phone.

Perhaps the fact that the user is no longer in his vehicle can even be conveyed through the data links on the cellular system to

When you're ready to talk to DEC*

with your IBM 3278,

talk to NPI about

getting attached to

a PCI 74D deconverter.

000 C1740

It will get you everywhere!

When you can no longer stand being cut off from the rest of the world because you have an IBM 3278, come to NPI

When the time comes that you want to talk to DEC, or check in with the Dow Jones™ News/Retrieval Service, or

contact your Local Area Networks, or whatever, talk to

Whether you want to make your non-IBM world compati-

ble or your IBM world compatible, NPI is the place to think of first. We distribute and service all PCI products.

alert the calling party and perhaps ask in synthesized voice or tone if the caller wants to send a page. The caller can hit an appropriate switch indicating yes, and a page is sent.

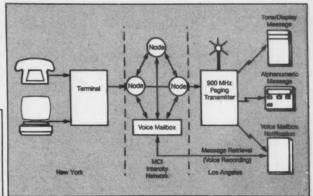
UTURE PAGERS WILL
be smaller, less expensive and therefore more
ubiquitous. Uses will
not be frivolous, but
practical: Babysitters
can reach parents in
case of emergency; parents can summon children home; businessmen can cut the umbilical cord of
the telephone; and fewer phone

memo pads will be needed.

The demand for paging service will be spurred by increases in channel capacity and advances in pager technology. With the demand comes technical innovation such as faster signaling speed, which benefits the carrier most directly and will ultimately benefit consumers with lower service costs.

The demand will encourage mass production, which, in turn, brings down the cost of paging devices.

There is a latent demand for personal message delivery service that will skyrocket once the consuming public is educated to the utility of pagers.



Nationwide Paging

Introducing COMPUTERWORLD BENELUX

Here's your chance to reach the Dutch computer community.

Computerworld Benelux is Computerworld's new sister publication in The Netherlands. We consider The Netherlands an exciting marketplace because 90% of the Dutch EDP equipment market is served by imports, and American manufacturers are presently the leading suppliers with 41% of the import market. More importantly, The Netherlands must increase EDP investments in order to maintain their competitive position in the world market.



The Netherlands ranks high in Western Europe for installed general purpose computers. And, according to figures from International Data Corporation, the world's leading information industry market research firm, it has an installed value of \$1.7 billion. In 1983, an estimated \$380 million was spent on purchases of computer and peripheral equipment. At the present time, there are 4,000 larger computers installed with a projected 15% annual increase.

Computerworld Benelux is circulated throughout The Netherlands, Belgium and Luxembourg to 20,000 key decision makers in middle and senior management in industrial and government organizations. The editorial focuses on the new developments in the local computer market, hardware and software applications, and company news.

CW International Marketing Services makes it easy for you to advertise in countries all around the computer world. For more information on Computerworld Benelux, just fill out and return the coupon below.



for a PCI 74D deconverter.

HE HIGH-TECH DEPOT REPAIR COMPANY
800-345-8278

45 COMMERCE DRIVE ASTON, PENNSYLVANIA 19014 Computer Departs

6 Leasers Associate

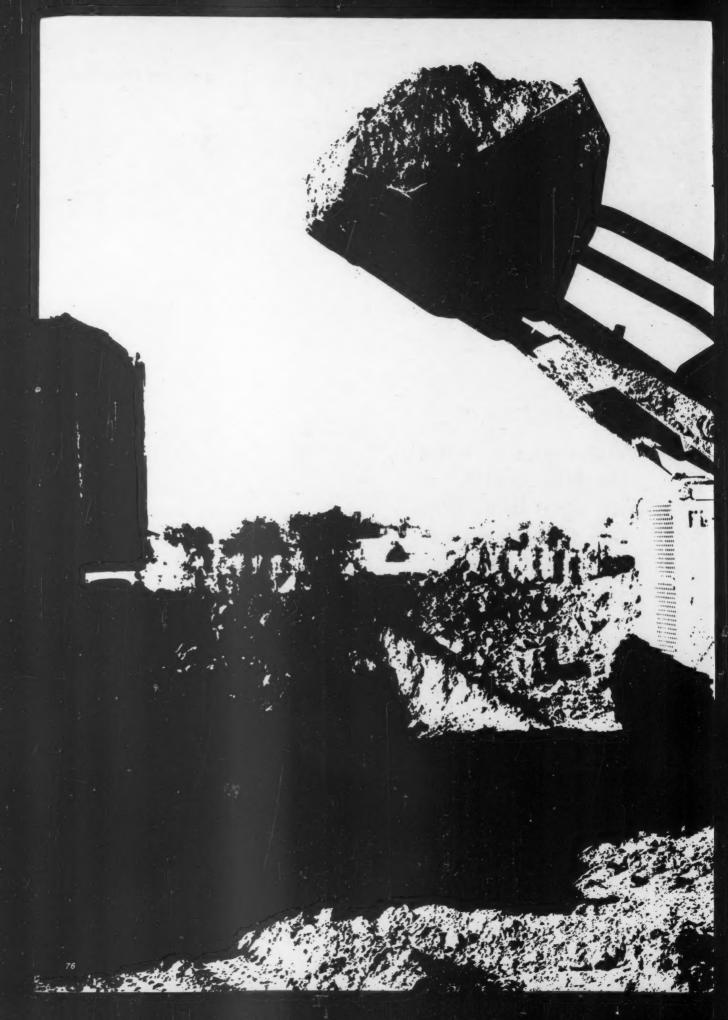
Old Distantion
ORALERIS

*DEC is a trademark of Digital Equipment Corporation

4					
и.	4113 C	M COW	MUNIC	ATTON	S/ENC.
	-	7			
Di	ana La	Mura	nlia Ge	neral l	Manac

Diana La Muraglia, General Manager International Marketing Services CW COMMUNICATIONS/INC. 375 Cochituate Road

	Please send me more infor	mation on:
	□ Computerworld Benelux.	☐ Your other publications
	Name	
1	Title	
	Company	
	Address	
	City	Ctate 7:e





BY D. R. McCORMICK

It's 1984. IBM has begun to ship 3725 communications controllers in volume. Systems Network Architecture (SNA) has been significantly enhanced with the capability to inter-connect multiple independent SNA tions controllers. NCR Comten. Inc. has announced new price/performance models of its line of communications front ends. Tandem Computers, Inc. will provide Snax — an SNA interface that allows Tandem's Non-



Front Ends

local area networks, gateways, protocol converters and private branch exchanges (PBX) that handle voice and data.

IBM introduced programmable communications controllers 12 years ago. SNA has been around since 1974. But if you ask the average data processing or data com-munications manager how he manages one of the most important resources in the information management shop, he will usually say he relies on the hands-on network executive (Hone) configurator to tell him how to add lines or storage to his controller. This is generally accomplished under the "Oops" principle: That is, add more resources to the box, and if no one complains about response time reductions or poor service

If you ask the average data processing manager bow be manages one of the most important resources in the information management sbop, be will usually say be relies on the Hone configurator to tell bim bow to add lines to bis controller. This is generally accomplished under the "Oops" principle: Add more resources to the box, and if no one complains about poor service levels — fine.

- fine. If you get complaints, back out the new resource and either add another line to the

controller or bring in another controller.

The Hone configurator is not

much help either, since it relies on an extremely specific set of input parameters that frequently are not known by people providing the input. As a result, more and more resources are required to handle the explosion of terminals and personal computers. There are also more and more alternatives for attaching these increas-ing resources through various black boxes

It is helpful to look at the basic rules of all communications controllers, which are also referred to as communications processors or front ends or front-end processors. The power of communications controllers can be described best in terms of blocks processed in conjunction with the telecommunications access method that resides in the main CPU or host

processor.

Little if any improvement in processing power can be gained by interacting with an access method like Btam, which interrupts the main processor a byte at time, vs. an access method like Vtam, which permits traffic to be assembled in blocks. Block processing significantly reduces the interruptions on the CPU. Correspondingly, scanners that process input to front ends greatly affect their power to handle aggregate throughput.

All traffic into a communica-tions controller is serial by bit. Some scanners accumulate bits into bytes, but the more efficient and more expensive scanners will accumulate bytes into blocks. Block scanners are more efficient because block processing reduces the number of interruptions on communications controller

IBM's 3705 and Amdahl's 4705 can be configured with either byte or block scanners that are hardwired. However, the trend is toward microprocessor and very large-scale integration chips that provide more flexible and lower cost ways of processing bits into blocks. The variety of tasks that can be modified via microprogramming increases the flexibility of the new hard-wired interfaces IBM's 3725 and Tandem's 6100 are examples of microprocessorbased scanners. Regardless of the technology — hard-wired or mi-croprocessor — mixing byte and block scanners in the same unit imposes severe throughput limitations

Byte scanners continue to hog communications control unit cy-cles even when configured with block scanners. So, the user who puts a block scanner in his machine to run higher speed lines reduces effectiveness. This may sound straightforward, but savings can be made by judicious reconfiguration of the network and intelligent reallocation of network resources, resulting in substantial performance improve-ments. Before you decide to move on to the new boxes, you may want to reevaluate your current configuration. This is especially true of networks with up to 1,000 logical units and transaction rates less than 75/sec.

FACE THE REAL COST OF DIVESTITURE!

Managing Complex, Multicarrier/Vendor Networks Diagnosing Faults Crossing Carrier Gateways! Interfacing Voice, Data and Telecom Equipment! Optimizing Hardware, Tariff and Software Opportunities!

Learn how at the new



Conference & Exposition

May 21-24 1984, Sheraton Washington Hotel, Washington, D.C.

Sponsored by the Communication Networks '84 Team

First program to ZERO IN on Divestitures' Operating Headaches — See new tech control and software solutions — Self diagnostic Modems & Components Computer programs for network optimization, change and equipment management!

Learn at In-Depth Seminars May 21 & 22



Dr. Dixon Doll Strategic Planning

Six other sessions on Net Diagnostics. Tech Control, PBX Interfaces, and

Choose from 40 "How-To" Conference Sessions May 23 & 24



Keynote Speaker: Dr. Lee Selwyn

Case Histories - New Applications Early Birds - Problem Solvers

Show Sponsors Include: Avant-Garde • Dynatech Data • General DataComm • Hekimian Labs • Racal-Milgo • Paradyne • Pulsecom Div., Harvey Hubbell Inc.

Exhibitors Include: Arus Corp., Datacom Management Sciences, Digilog, Digitech Industries, Infinent, Infotron, International Data Sciences, NEC America, Versa-Lite,

and more

Exhibits will be open: Mary 23, 9:30 - 5:00 and Mary 24, 9:30 - 4:00.

For Full Program Information Call 1-800-225-4698 (In Mass. 617-879-0700) or return the coupon below to

Communication Networks — NM/TC, Box 880, Framingham, MA 01701

Register me for: Two-day In-Depth Sessions (May 21 & 22) \$595	Ncme/Title
NM/TC Conference (May 23 & 24) \$295	Compony
Four Day Full Program (May 21 - 24) \$795	Telephone ()

It is helpful to examine how the main vendors' products stack up now and what may be in store for the future.

The 3725 was announced by IBM in 1983. It was upgraded in November with added functions, which further sets it apart from the

Clearly, this is the unit for the large SNA user who will be handling many medium- and high-speed lines concurrently in the same box. This unit's ability to ac-commodate as many as 14 256K bit/sec lines demonstrates the power that can be contained in one unit with balanced input and output.

Two additions to the 3725 not found on the 3705 are 128 modulo on links between intermediate routing nodes and 2M bytes of storage for additional buffer space on larger gateway network control programs (NCP). The 128 modulo addition allows up to 127 blocks of data to be transmitted before waiting for a receive acknowledg-

The 3705 architecture is limited to 1M-byte addressing. It is not clear why 128 modulo is not supported on the 3705. Last November, IBM said NCP Version 3 would be the last functional enhancement for the 3705 family. So, for IBM customers who have embraced SNA and, in particular, its Multisystem Networking Feature (MSNF), it would appear that all roads will eventually lead to the 3725 or similar versions. Amdahl Corp. will need to launch its version of the 3725 to maintain market presence.

F THE 3705 WILL NO longer enjoy functional enhancements, what is in store for the 3705-80 class user? Obviously, a smaller version of the 3725 must be in the wings. The 3725 Model 2, at \$15,000 less than the 3725 Model 1, is a feeble attempt to offer a lower cost version of the 3725. Even though the Model 2 permits the user to upgrade to a Model 1 with a minimum amount of parts on the floor, the price difference should be weighed carefully before a commitment is made, especially since the price is less than 15% of a similarly equipped Model 1

This 15% is a modest price to pay to avoid possible service in-terruptions when a future model upgrade appears. Technology improvements should yield a small-er version of the 3725 in the 3705 80 price range or lower. This unit would be suitable for future intermediate routing nodes in the large MSNF network. For the time being, support of the 3705 by SNA interconnect will give it and the 4705 short-term life in this environment

Of course, the whole world is not composed of multiple IBM 370s talking to one another. For the very large base of single-CPU or single-establishment customers, the current 3705 family and

look-alikes will fare well and provide competitive solutions to their front-end needs. Prices for used 3705s have fallen below 50% of IBM list. Certain configurations will undoubtedly be cheaper than

Add a recent new development to all this. A California firm is testing a 1M-byte memory that is physically housed in the first frame of a 3705-II or 3705-80. When IBM upgraded the 3705 to 512K bytes with the J-K series, it 512K bytes with the J-K series, it automatically gave the 3705-II addressing capability to 1M-byte. Amdahl was the first to exploit this capability in its 4705E machine. This new memory development for the 3705 will give the large base of purchased 3705s a new lease on life. Users will be able to run their current software

with mininum change.
Where is all this activity going to leave Amdahl? For one thing, the 4705 and the 4705E have a faster engine producing more communications control units than the 3705. This is particularly valuable in running large 3270 Binary Synchronous Communica-tions (BSC) networks where the 3705 runs out of cycles before it runs out of storage. Amdahl also has the ability to run NCPs greater than 512K bytes without moving to the newest Vtam and other host software products that are neces-

sary to operate 3725s.
Surprisingly, NCP Version 3's ability to extend key control block above the 64K-byte boundary makes Amdahl and the memory

expansion feature significantly more viable than previous NCP releases that could impede efficient use of memory beyond 512K bytes

Furthermore, there is a sizable base of Amdahl 4705s that interface to X.25 public and private networks. This should allow them to maintain momentum throughout 1984. Look for a drop in 4705 sales as the large customers begin making new decisions to expand their networks or start taking advantage of lower tariffed 56K bit/ sec and T-1 speeds. Of course, Amdahl could provide modifica-tions to the 4705 NCP to equal the 3725 functions. However, this would increase their costs and create maintenance problems on the base NCP.

3270 COMPATIBILITY AND DIALBACK SECURIT



IN ONE INTEGRATED SYSTEM!

Wall Data, the industry leader in multi-function protocal conversion products. announces another major advance. Last year, Wall Data introduced the DCF series, the only protocol conversion system capable of concurrently supporting multiple protocols and multiple hosts

Now Wall Data enhances that flexibility with INTER-GUARD, a dialback security feature that offers extra protection for dial up access to data networks.

Here's how INTERGUARD works:

1. A remote terminal or PC dials up the DCF.

2. The DCF prompts, "ENTER LISER ID"

3. The user keys in his ID.

4. The DCF verifies the ID. 5. If valid, the DCF displays "I'LL CALL YOU BACK,"

and disconnects. 6. The DCF looks up and dials the telphone number associated with the

user ID. 7. The user answers, and the DCF prompts, "ENTER HOST PASSWORD."

8. The user keys in the host password.

9. The DCF connects the user to the host and displays the logon screen.

Thus INTERGUARD provides three levels of security to protect your computer resources from unauthorized

access: user identification, location identification, and password authorization.

Other features include: Dialback security and protocol conversion in

one unit Up to 15 dialup ports • 128 user IDs and

telephone numbers 20 host passwords Support for many auto-

dial modems • Easily maintained ID and password tables

Idle-time disconnect

 User specified retries and Priced as low as \$333

per port And, for minicomputer users, Wall Data offers standalone INTERGUARD systems without protocol conversion in four- and eight-port configurations.

For more information call Wall Data today.



The Data Communications Facilitator.

Wall Data Incorporated 14828 Northeast 95th Stre Redmond, Washington 98052 206 883 4777

1 800 433 3388

Front Ends

NCR Comten's family of communications processors was given a significant shot in the arm with a new round of price/performance to replace its aging 3650, 3670 and 3690 series. Comten is alive and well and enjoying continued growth. It is obvious that the explosion to teleprocessing, on-line data bases and personal computing has not hurt them.

Comten has an impressive array of hardware and software packages. Despite significant IBM enhancements to SNA, Comten has managed to remain in the game much like the non-IBM system vendors by growing its own base. According to a source within the company, 1983 was a banner year for new accounts, with sales up 30% while income jumped 65%.

Starting last fall with the 3650 replacement and continuing in February with upgrades to the 3650 and new models of the 3690, Comten has set a new level of price/performance that effectively lowered prices as much as 42%. The new models offer circuit density in a smaller foot print, thus allowing additional lines and storage in the same frame.

As with everything in telepro-cessing these days, the real news is in software. Two new communications programs were announced in February. The first is Communications Access Method (CAM 3), a pseudo-systems service control point-like function in the front end that allows the network operator to activate and deactivate network resources. This program is viewed as a base on which new functions will be added. It allows communications applications programs within Comten unit to communicate with applications in other Comten units and on SNA or non-SNA hosts

The second program, Automatic Message Switch, is essentially Comten's old distributed switching system with a new name. It permits journaling, logging files and dial-in and dial-out facility for store-and-forward applications. Here again, Comten's software re siding in its 3650 series equipment acts somewhat as an out-board Tcam.

Unlike the architecture of the Amdahl 4705, Comten's architecture is unique. Therefore, its control program is a functional equivalent of IBM's NCP. Comten claims the latest version ACP/NCP 3 Release I is compatible with IBM's NCP Version 1 Release 3 to the extent that Comten units can communicate over cross-domain links with 3705s with complete transparency. A new upgrade to the Mulitiple Access Facility pro-gram called remote host option provides 3270 BSC or Synchronous Data Link Control (SDLC) clustered terminals access to non-SNA hosts. The software makes a Comten port look like a 3271/ 3274 BSC attached to Comten processors to access any host that supports 3270 SNA terminals. Programs like this that Comten has successfully marketed provide added value over IBM standardized software.

Comten's family of communications processors was given a significant shot in the arm with a new round of price/ performance to replace its aging 3650. 3670 and 3690 series. Comten is alive and well and enjoying continued growth. It is obvious that the explosion to teleprocessing, on-line data bases and personal computing bas not burt them.

Comten's main strength and past success were built on the functional deficiencies of IBM's

made the average office desk look

speakers and autodialers and intercoms and

like the average garage sale with

coax footprints all over the place.

3705 in non-SNA access methods: multiple concurrent channels, site-initiated line switching, ter-

minal-initiated line switching autobaud detect and autodial and multiple access facility (a means of switching 3270 heads between of switching 3270 heads between applications residing in one or more hosts). With the exception of concurrent channels, site-initiated line switching and terminal-initiated line switching, these functions continue to be Comten's exclusives in non-SNA net-

Comten's Communication Network System package permits start/stop and BSC protocols to be networked, thus providing trunk sharing for non-SNA applications like Rtam and VM.

Comten's weakness is its vul-nerability to an increasing accep-tance of SNA. Some recent improvements, such as Virtual

nication power on standard

There's a \$100 ROLMphone® with single button commands, speed dialing,

telephone wire.

We didn't kill analog phones. Honest. All ROLM has done is to intro-Analog phones killed analog phones duce an entire family of phones that Because they required sepabring digital technology all the rate systems for data and voice. way to the desk. So, for the price Because they required compliof an analog phone you can cated access codes. Because they have unheard-of commuCommunication Network Application and Remote Spooling Communications Subsystem-SNA, make VM access via SNA networks more viable. Non-SNA interconnection, a new program product that runs on the Network Extension Option interface of NCP, pro-vides trunk sharing between NCPs for remote job entry devices that access Rtam. The increasing use of protocol converters to encapsu-late or convert non-SNA terminals further erodes NCR Comten's once unique capability to accommodate special terminals. This is especially true in the '80s with the communications world converging for the most part on Teletype-writer, BSC-1, BSC 3270, High Level Data Link Control and Level Data Link Control and SDLC. With the exception of airlines protocol, it is a rare terminal manufacturer that would venture into a unique protocol other than the above.

ONTINUED EXPANsion of unique applications involving disk storage for message switching and off-loading the host pro-cessors must continue to avoid attacks from the likes of Tandem. Tandem is rapidly making a name for itself in both the stand-alone and front-end area, particularly in banking and manufacturing.

Nevertheless, there is a bright

future in store for Comten. Cer-

tainly, as its parent company, NCR Corp., strives to beef up its image in the communications industry, Comten's communications expertise complements NCR's stride to be a dominant factor in office automation

Surprisingly, there are some 270X and 270X look-alikes still to be found. Some brave souls like Lemcom even saw fit to manufacture a 1980 version of mid-'60s technology. Memorex Corp., Lemcom and financially plagued Communications Controls, Inc. suffer from the same malady. They are not extendable. They are limited to archaic access methods that impose restrictions, namely tightly coupled ownership of terminal/line to the application, subchannel address limits, inefficient

use of CPU cycles and interrupts for primitive teleprocessing functions. Nevertheless, the sheer number of these systems still in existence endorses the old adage, "If it's working, don't touch it."

Several manufacturers chosen another route to fake out Big Blue. They make their communications attachment look like a channel device. The fact that they choose to look like a channel-attached device imposed automatic constraints on expanding their capability. Such exam-ples as Paradyne Corp.'s Pixnet ples as Paradyne Corp. and ITT Courier's 3271 look-alike provide remote computing for limited functions. Even IBM joined this game in 1983 by providing a Teletype attachment to its 4300 line via the 4994 Ascii control unit. The 4994 makes the Ascii terminals appear as a 3277 ter-minal using a host-loaded version of the Yale University Installed User Program. This program allows access to VM/CMS applications

This is an apparent attempt to provide a lower cost communications controller and terminal subsystem in the highly competitive scientific market. At \$1,277 per line for a 16-line configuration and \$2,250 per line for 48 lines, using a modified Series/1, it looks like the IBM product develop-ment center in Boca Raton, Fla., is its counterpart in Gaude, France a run for its money. Can BSC/SDLC be far behind?

AST YEAR, TANDEM announced a software package called Snax that accesses SNA-based applications. Tandem's has rapid rise has been based on its fault-tolerant design mainly in the banking area. Tandem is most notable for its ability. transaction processing ability. Tandem's new Nonstop TXP system and a broadening hardware and software product line could make its approach an alternative to SNA. It certainly has an architecture that permits growth and expansion with a minimum amount of disruption. This function, known as network dynamics, is a recognized requirement of IBM's SNA architects.

It will only be a matter of time and resources to see how long it takes IBM to make SNA more open and flexible. How soon this happens and how many resources IBM will throw behind the effort remains to be determined. On the other hand, companies like Tandem need to fill in the holes in their networking offerings. Tan-dem has the hardware to build on and will probably rely on a combi-nation of in-house packages cou-pled with value-added reseilers to attain the function richness of SNA networking.

As products mature, new soft-ware becomes available that reduces the amount of "roll your programming that is sometimes the case when dealing with vendors that are outside the mainstream. One such program from a



voice volume control and an optional RS232 port for flawless, simultaneous data and voice

There are ROLMphones with more feature buttons, more lines, hands-free speakers and autodialers. There are ROLMphones that can tell you the caller's name, the extension number, the elapsed time of the call, the cost of the call.

Then there's Cypress."

Cypress is a super compact, smart ASCII terminal

and a totally integrated, full-featured digital phone.

The ROLMphones are simply the finishing touch to the most inevitable business communication system in the world today - the latest reason why more than two-thirds of the Fortune 500 companies choose ROLM.

If you'd like to see what a business phone system can do today, next year, into the next century, pick up that Plain Old Telephone and call ROLM.

4900 Old Ironsides Drive, M/S 626, Santa Clara, CA 95050 • 800-538-8154. (In Alaska, California and Hawaii, call 408-986-3025.)

Front Ends

value-added reseller will enable a user to modify Btam and interface it with any Tandem computer. This will allow communications between CICS applications and terminals attached to the Tandem computer. The host attachment program uses one channel of a 3803 tape control unit as the main physical link. The program views this line as logical subchannels to the Tandem unit where table-driven pools of terminals can contend for sessions with CICS

In applications where the access to the data base can be split between inquiry and update, such as negative credit check in the banking industry, Tandem places copies of the data on outboard files generally in some logical fashion that permits multiple access with minimum queues. Simple inquiry transactions can be ex-ecuted swiftly without the added overhead of accessing the mainframe. Inquiry files are then updated periodically from the main data base. There is no magic involved; the same process can oc-cur on IBM mainframes. The result, however, becomes costly when encountering the overhead in today's 370-based applications and long instruction path length per transaction.

Christian Rovsing entered the fault-tolerant front-end world in 1983. It successfully won the contract to supply the front ends and consequently the data network for Air Canada, American Airlines and LM Eriksson. Rovsing, a Danish electronics manufacturer of fire control equipment, North Atlantic Treaty Organization communica-tions gear and aerospace equipment, claims to provide complete transparency to Vtam-based applications. This is accomplished using a Physical Unit 5 appearance between the host and the Rovsing computer

Roysing also combines SNA capability with X.25 permitting non-SNA hosts and terminals to be networked along with SNA de-vices in the same transport sys-tem. This is another example of a manufacturer meeting a market requirement for a single transport mechanism. Rovsing may not have a strong presence in the U.S. today, but it only took Tandem eight years to go from nothing to over \$300 million a year and a compound growth rate that would be the envy of any new venture

company

What is in store for communications in the future? More of the same - evolution, not revolution. Even IBM now sees fits to acknowledge, through statement of directions and SNA architecture seminars, that extended addressing, an increasing tendency toward peer-to-peer communica-tions and a direct Vtam interface for VM systems are high on its list of requirements. Increased emphasis on ease of use and network system management is another IBM priority.

This modem will pay for itself in four months.

The incredible AJ 4048-now with error-free asynchronous transm sion-will send your data over 2-wire dial-up lines at 4800 bps full duplex.

It's the first high speed full-duplex 4800 bps modem developed for use over ordinary 2-wire telephone lines. By dramatically reducing connect time, the AJ 4048 can cut your transmission costs in half. And make your computer more efficient.

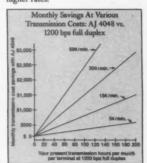
There's no need to compromise accuracy for speed and savings. Because the AJ 4048 now provides error-free transmission with error detection and retransmission capability.

The AJ 4048 operates either in synchronous or asynchronous modes. It eliminates the need for expensive 2wire or 4-wire leased lines, and sidesteps on-going leased line rate increases.

Big savings, fast payback.

If you're now using 1200 bps or 2400 bps modems, the AJ 4048 can eliminate unnecessary connect time. In fact, if your company's current 1200 bps full duplex data transmission is around 12 hours per week, an AJ 4048 could pay for itself with connect time savings in about four months.*

Bigger savings yet if you transmit more frequently, or consistently at higher rates



Now you can transmit asynchronous data as accurately as synchronous data. The AJ 4048-AEC with error detection and retransmission (EDR) automatically detects errors and retransmits data. With virtually no effect on throughput. And no need to write new software or

EDR permits high speed operation over ordinary dial-up lines for asyn-chronous applications that require total accuracy. Finance, CAD/CAM, graphics, remote diagnostics, program downloads, on-line typesetting. And more.

The AJ 4048. Manufactured, sold, leased, and serviced by AJ. It's slashing the cost of data communications. Error-free.

Write or call for our free catalog. Anderson Jacobson, Inc., 521 Charcot Avenue, San Jose, California 95131. Regional offices: Chicago, IL (312) 671-7155; Fair Lawn, NJ (201) 794-9316; San Jose, CA (408) 263-8520.

ANDERSON JACOBSON

mation on voice-data inte-gration. Read William F. Zachmann's article, "The Myth Behind Voice-Data Integration" in the Sept. 23, 1983 edition of Computerworld on Communications. He has the best insight into stifling all the hype that has arisen in the last year over this issue. Suffice it to say that it will be a long time before PBXs replace today's communications control-lers. That is not to say the communications controller will remain the same as today's traditional 3705 and 3725 family. As large

F YOU PAY ATTENTION

to these new avenues that

things to come from Big Blue, you will find a conspicuous lack of infor-

promise

companies move into digital switches for their voice traffic, there will be an increasing emphasis on tying their major switch points together with high bandwidths, such as AT&T's Accunet

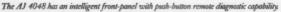
1.5M bit/sec service.

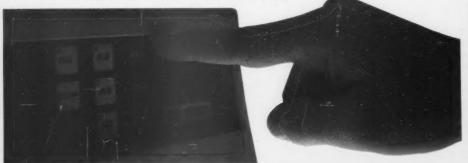
This is already happening in some forward-thinking communications departments. With large pipes for voice between major digital switch points, the data traffic interspersed with voice traffic becomes cost-effective. Terminals and applications will share these digital highways by combining and multiplexing slow-speed data traffic into 56K bit/sec data streams at remote concentration points and sending it directly to data communications controllers through digital switch points to be processed either as an SNA or X.25 packet.

The result will be more high-

speed ports entering the communications controller and a reduction in slow or medium-speed ports that will be concentrated at remote sites. A further reduction in the number of physical ports on communications controllers will be caused by the increasing use of local-area networks. As terminals within an establishment migrate to the local-area networks of the future, the need for limited-dis-tance modems and locally at-tached lines will diminish since the local network connection will undoubtedly connect directly to the communications controllers

So what will the future hold for communications controllers? As an old IBM acquaintance once said, "A very big heart and very short appendages.







BY JOHN VACCA

Electronic Funds Transfer (FFT) — the electronic banking vision of a checkless cashless society — is an idea whose time has finally come. It is a complex concept, especially when one delves into its various technical ramifications. IEE is composed of highly sophisticated electronic systems that can handle an individual's personal financial transactions, such as authorizing settlement of monetary obligations, receiving payment for services, causing in restaurants or shopping in stores. Businesses, corporations, partnerships, single proprietorships, and government are also encompassed by the broad applications of FFT. Through FFT techniques, corporate treasurers can now manage operating cash requirements more cost effectively by moving funds freely from the place where funds accumulate to where they may be needed at any given time. With FFT, companies can now initiate payment for goods and services as a by product of daily business transactions. Business has enjoyment for goods and services as a by product of daily business transactions. Business has enjoyment for goods and services as a population of the first methodology wholeheartedly.

Vacca is a freelance writer and consultant based in Topeka, Kan

Why' for one thing. LFT has permitted the optimization of cash flow in both ▶

business and government. EFT encompasses a broad range of possible payment systems and services di-rected toward substituting an electronic transfer of value for a paper transfer of value, either wholly or in part. It is not a single system, but a set of interrelationships that are in a constant state of transition.

In order to keep up with the ever-increasing trans-action volume, the bank-ing system, which is in

danger of drowning in a tidal wave of paper, is well along in perfecting EFT. Banks are employing automated clearing houses, associated data networks and shared networks such as Wire. Fed Wire, Bankwire, Chips, Swift, The Ex-change, Cirrus and so on. Therefore, better service must be rendered through the use of automated teller terminal systems, at the customer interface level and at the local bank branch. These systems speed up customer service and allow instant verification of account balances and even signature valida-

As of January 1984, an estimated 13,979 of a total of 17,839 commercial banks and 3,977 out of a total of 25,081 thrift institutions (including savings banks, savings and loan associations and credit unions) were members of the Automated Clearing House system. The Nation-Automated Clearing House Association, run by the Federal Reserve Sys tem, electronically links 35 local automated clearing associations.

During the month of December 1983, the priestimated \$16.8 million in debit and \$8.7 million in credit transactions. In the government sector in the same month, there were an estimated \$39.9 million of credit transactions, covering social security pay-ments, federal pension payments and federal payroll credits.

Growth of electronic payments, measured in transactions processed, from the present to the year 2000, is shown in the figure on Page 85.

The cost of tellers is ris-

ing; wherever possible, they must be used more

productively and replaced by automated teller machines. The latter have the advantage of 24-hour availability and, in theory at least, do not make mistakes. At the same time, banks are facing increas-ing competition from bro-kerage houses and the savings and loan industry in such areas as cash management accounts. In other words, commercial banks must become more effi-cient by using the elec-tronic route to the fullest extent possible.

A significant developing trend is the provision of more convenience for automated teller machine customers through shared



A 3270 Protocol Converting Controller



ASCII Terminals ■ Personal Computers ■ Printers To 3270 SNA/SDLC and BSC

Features:

- **3.5.7.9.12.16.20.24.32**
- synchronous ports
- Full (seven) color and extended highlighting
- Dial-up or direct connect MABRD to 19.2K baud
- Password protection
- No host software changes
- Menu driven setup
- Battery backup memory
 Inactivity timeout
 Graphics pass through

Benefits:

- Access the network from
 - anywhere
- Choose any terminal or printer

 Reduce costs per port and
- per station

 Eliminate need for multiple
- terminals
- Mix personal computers and
- asynchronous terminals
 Process locally then connect to the 3270 network

Call or send for more details today.

CORPORATION (703) 451-2200

Renex has the solution!

Models Are Available For Systems 34/36/38.

Question of Security

As the economies of developed countries be-come increasingly reliant on electronic funds transfer (EFT) and the inter-connection of systems, the security of EFT systhe security of EFT sys-tems is going to become an important part of na-tional security. Tradition-ally, funds have been credited and debited by accounting offices. The funds have been stored in steel and concrete vaults and moved in armored , airplanes and railroad cars, accompanied by uniformed armed guards. In addition, funds have also taken the form paper checks, securities, notes, telegrams, letters, warrants, money and precious metals.

Increasingly, the transfer and storage of funds is accomplished in milliseconds via data communications circuits and magnettions circuits and magnetic domains. A large commercial bank transfers \$40 billion each day, and the U.S. Rederal Reserve Fed Wire System turns over an amount of money equal to the national debt every five days

At present, the U.S. re lies on four major funds transfer systems. These are the Fed Wire, which is operated by the U.S. Fed-Reserve System; Bankwire, a private computerized message system administered for and by participating banks through the facilities of Western Union; Chips, the Clearing House Information Processing System, a private system owned by the New York Clearing House and linking 111 banks; and Swift, the Society for Worldwide Interbank Financial Tele-

communications. Swift is a nonprofit cooperative of 860 banks in 22 countries, with two computer centers, in Belgium and the ters, in Belgium and the Netherlands. These four systems transmit \$410 billion per day domestically and \$700 billion per day internationally. They are backed up by the Telex communications. communications net-work, which could be

used as an alternative.

A massive change in funds transfer has been caused by an increase in the amount of money caused by inflation and worldwide industrialization and the increased tion and the increased movement of money. To-day, bankers sign their names on pieces of paper authorizing billions of dollars to be transferred by 50 or 110 clerks in rooms filled with computer terminals, zapping transfers by the thousands all over the world.

EFT also includes serving individual depositors

EFT also includes serving individual depositors who use automated teller machines, but the major focus of concern is the transfer of large amounts of money from bank to bank and between banks and businesses and governments. Money managers in large firms now have their own computer terminals for direct communication with their fi munication with their financial service institu-

As developed countries become increasingly de-pendent on fragile computer and data communications systems containing funds stored in concentrated electronic form, some systems may have to be protected in ways similar to military

tary-quality cryptography, armed personnel, for-tress-like housing, levels of classified secrets and associated procedures, employee background clearances, military disciplines and severe criminal sanctions for fraud, sabotage, espionage and other crimes.

In any reasonable approach to security, a risk analysis should be conducted before such exanalysis should be conducted before such extreme military measures would be warranted. Risk will be highly variable, depending on the factors of probability and loss. Although there is not yet enough information to calculate this risk accurately for the entire banking industry, possible alternative factors in risk reduction may be identified to some degree.

There are alternatives that could be considered for dealing with the future risks to EFT. The most practical and effective alternative involves a combination of advances in safeguard research and development.

combination of advances in safeguard research and development, finding ways to impose greater discipline on EFT employees and the enlightenment of EFT owners

and users.

Out of self-interest, the operators of EFT will not expand their systems beyond an acceptable level of risk, but the potential risks will have to be known and anticipated before adequate degrees of security and reasons for motivation can be provided to keep risk under control. Future risks will be hard to predict, but a continuing effort to study potential risks as EFT technology advances is surely systems. This implies nology advances is surely such safeguards as mili-prudent.

networks. In a true shared network that has a highly competitive environment, it may be more prof-itable for large banks or a third party to help a smaller bank develop a switched system.

Some of the benefits of shared

automated teller machine net-

works are:

The ability for regional and community banks to offer services they could not otherwise afford and, thus, compete with larger banks.

■ The competitive advantage of a large base of cards over specialized, regional cards;

■ The possibility of turning a profit from processing electronic

transactions.

Sharing, therefore, may be more beneficial to small rather than to large banks. Why? Because it brings them economies of scale. In addition, it will increase transaction volume, lower operating costs and permit banks to reduce their prices for services

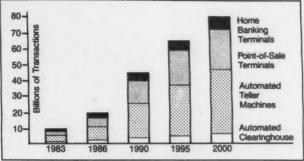
So, how long will it be before a true national shared system devel-ops? The answer is that one exists now. The demand for services has increased tremendously, and security and liability issues are starting to be resolved, although it will be many years before their final resolution. However, experts expect that a majority of banks will affiliate with two of about eight national electronic banking networks and that these national networks will consolidate many retail banking services. Two of the most innovative shared networks that are successfully meeting the challenges of today's financial services industry are Cirrus and The Exchange.

The Cirrus system is a nonprofit membership corporation signed to help its members meet present and future financial services industry challenges. Incor-porated in 1982 with headquarters in Oak Brook, Ill., it was created by a group of the country's strongest and most innovative banks: Manufacturers Hanover Corp., New York; First Interstate Bancorp, Los Angeles; First Chicago Corp., Chicago; Mellon Bank, Pittsburgh; and others. The system presently serves 41 states, including nine of the nation's 10 largest metropolitan areas.

According to Bruce Burchfield, president of Cirrus Systems, Inc., the Cirrus concept is an exciting development in the area of interstate banking, because it opens the doors to other types of services which cross state lines, which have been prohibited by the banking laws.

It offers new members the competitive edge of national capabili-ties, while enabling them to offer their customers the added service their customers the added service of instant access to their savings, checking and credit accounts practically anywhere in the coun-try. "At the business end, of course, from a consumer's stand-point, it really recognizes that consumer needs don't end at the state borders," Burchfield pointed

Membership in Cirrus is exclusively reserved for banks, savings



The Growth of Electronic Payments

and loan associations and credit unions. Associate membership is limited to banks. Cirrus does not

preclude its members from joining other networks, nor does it require the sharing of other elec-

services point-of-sale terminals. Only principle members are required to bring automated teller machines into the system.

All Cirrus automated teller machines must also be on-line in order to authorize transactions. The Citrus switch, maintained by the National Bank of Detroit, does not currently provide backup authorizations for its members. However, the network ensures against switching downtime by utilizing a Tandem Computers, Inc. ACI/Tandem Computer, a totally redundant system.

Individual Cirrus members are responsible for the cost of hooking up to the switch and maintaining the connection. They also pay for any hardware and software



modifications necessary to comply with the network's operating rules.

The Cirrus system ren resents a technological in-novation that could have a far-reaching effect on personal banking and money management in the future.

EXchange is another innovative shared network. The Exchange is a nonprofit COTporation that was formed to research and develop shared EFT services for member institutions to enable them to compete with major financial institutions. It is owned by those financial institutions with Washingstate memberships and its corporate head-quarters is in Bellevue, Wash. Exchange members include state and federally chartered savings and loan associations, state and na-tional commercial banks, mutual savings banks and credit unions.

The original business authorized by its member institutions is the operation of a shared automated teller machine network. The Exchange also designs and produces plastic cards for member institutions that want card support services.

In June 1981, The Exchange signed its most sig-nificant contract with Automatic Data Process-ing, Inc. (ADP) of Clifton, N.J., creating a national EFT network. The Exchange feels this connection is advantageous to both sides. The Exchange's highly developed documentation, graphics, contracts and programming items combined with ADP's resources and technological position in the industry make it one of the strongest EFT systems in the country.

The Exchange currently supports IBM 3624, Docutel Corp. 2380, 5100 and 5200 and Diebold, Inc. 910 automated teller ma-These machines chines. are capable of handling as many as 60 transaction types, including deposits, withdrawals and transfers.

Most Exchange automated teller machines issue funds in increments of \$5 or \$20. The new automated teller machines being installed through the Tandem Computer system will support multiline screens and 47 different transac-

The Exchange regional switches are made up of a

Tandem Nonstop performance computer, which which acts as a go-between for Exchange automated teller machines and member institutions. When a customer uses an automated teller machine, the regional switch receives electronic messages and transmits them to the appropriate institution's computer center. That computer makes decisions concerning the transaction and transmits them back to the switch.

The switch then directs the automated teller machine to dispense cash or to perform some other function. Located in Seattle, Wash., the switch coordinates all transactions made within this region.

The Exchange National Switch, which is located in Clifton, N.J., and owned by ADP, acts as a go-between for all Exchange regional switches. When a customer requests an automated teller machine transaction from another regional switch, the request passes through the Exchange National Switch to the customer's switch for authori-Exchange zation. The National Switch can also function as another re-gional switch by supporting its own automated tellmachines and host er computers

The Exchange System should be viewed as a delivery of services to member institution customers.

The Exchange moves routine transactions from institution lobbies so that personnel can be better utilized in solving individ-ual customer problems.

Who are the DP industry vendors that enjoy growth and prosperity as a result of the surge in EFT appli-cations? Burroughs Corp. and NCR Corp. are substantial participants, but their involvement is diluted by their overpowering commitment to general

SIEMENS

What separates our least cost routing from all the others?

Unlike other PABX manufacturers, Siemens gives you genuine cost-cutting control with Dynamic Multigroup Queuing, an exclusive standard function of the least cost routing fea ture of our SATURN™ digital PABX systems.

Dynamic Multigroup Queuing automatically assures that calls will always be placed at the lowest possible costs. True "look back" capa-bilities enable our systems to expand the queue and seize the least expensive route (FX, SCC, WATS, DDD) available, improving trunking performance while lowering long distance costs by as much as 30 percent. No other company offers this money-saving advantage. But Siemens offers even more.

More capability... For maximum cost efficiency. There's quite a big difference in today's least cost routing systems. Some offer more capability than others. Siemens provides the most comprehensive LCR feature in the industry as a cost-saving standard function of SATURN systems. Our complete LCR package includes:

- 128,000 central office area code combina tions with direct access to 3 SCC networks.
- ► Rotary dial area customers can now access SCCs through SATURN's ability to flip-flop from dial pulse to DTMF.
- ► Full digit number analysis—Lowers net-work costs, increases efficiency through analysis of entire digit number, as opposed to 3- or 6- digit analysis offered by other systems.
- ➤ Programmable search timer-controlled advance-Improves network efficiency by ensuring that optimal queuing time is attained before advancing to next trunk group.
- ➤ Day of week/Time of day controlers network costs, improves service, and maximizes non-usage sensitive routes

- ► Wide Band Tone Detection—Provides a wider range of frequencies to detect SCC dial tones. Insures digits will be accepted by the SCC. Simplifies complicated routing procedures. Improves speed and performance in network applications
- ➤ Special service code routing—Removes service traffic from all but DDD routes. Prevents clogging of expensive routes with "no cost" calls, increasing network efficiency and lowering overall network costs.
- ► Digit Translation—Adds or deletes digits as necessary to complete calls via the selected route element.

Applied technology...
For improved communications management.
By applying field-proven technology to its digital telephone systems, Siemens automatically saves you money by controlling your telephone costs. Our advanced LCR is just one of the many standard features specific engineered to make day-to-day business communications easier, more flexible, and more affordable

For further information, or the name of the SATURN Gold Seal Dealer in your area, call 1-800-327-0636. (In Florida, Alaska, and Hawaii, (305) 994-8100 ext. 5330). Siemens Communication Systems, Inc. Office Systems Group 5500 Broken Sound Boulevard Boca Raton, FL 33431.



Siemens. Innovations in telecommunications for over a century.

mainframeoriented data processing. Diebold, Docutel, IBM and Intelligent Systems Corp. have specialized in this market. These firms should achieve above industry-average revenue in-creases of well over 19% a

Among the data processing services firms, ADP, National Data Corp. and Tymshare, Inc. have focused on the EFT market, but only the latter two have had a significant enough commitment to influence their short-term sales growth.

In spite of the promise of increased efficiency and reduced cost. EFT systems reduced cost, EFT systems face assorted problems. Chief among these are consumer resistance and legal problems. Consumers are worried about:

Privacy invasion and the potential for abuse of information collected;

■ The possibility of com-

puter crime and error;

The probability that the cost of implementation will be passed on to them;

The lack of the security associated with cancelled checks and sales receipts; ■ The loss of float:

■ The possibility of lost or stolen cards;

The reliability of systems

Legal problems relate to: federal regulation; the establishment of branch banking, which is limited

or prohibited in 31 states; uncertainty as to whether terminals constitute branches; and government acceptance of shared terminals between compet-ing financial institutions.

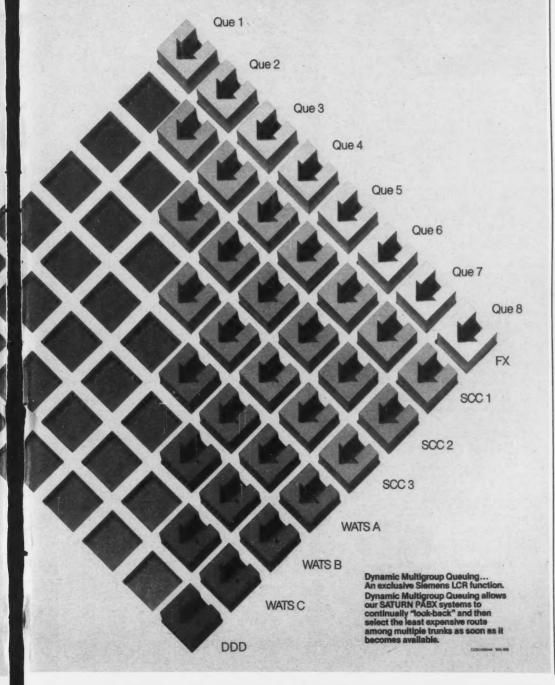
In some states, restrictive laws prohibit most offpremise terminals. Banks in such states will be at a disadvantage compared with those in unrestricted states in gaining EFT markets. The Supreme Court has ruled that retail pointof-sale machines branches if they are used for deposit- and withdrawal-related services. such, they must comply with the banking restric-tions of the state within which they are located. This ruling applies only to commercial banks. Thrift institutions are not prohibited from offering deposit and withdrawal services at point-of-sale terminals.

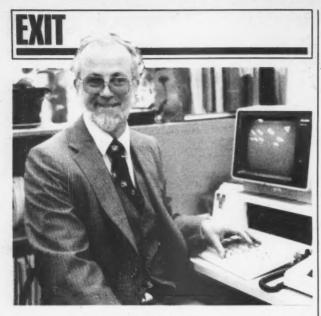
Special legislation is required to install off-pre-mise EFT machines in states where branches are prohibited or restricted. Several states have enacted legislation to exempt retail machines branch restrictions. In other states, sharing of all EFT machines is mandatory, which effectively restricts a bank's EFT activity.

EFT has already become a major business. Eighteen or more large banks are now offering EFT service as a local, in-state service. Their experiences are building a log of advance data on the public re-sponse to and evolution of such systems. Although the current installations are too localized to report in detail, general public reaction has demonstrated the trend toward quick acceptance of EFT.

IN 1983, ABOUT 51,000 EFT termi-nals were estimated to be in operation. However, it is esti-mated that about 204,000 terminals will be in operation by the year 2000. Nevertheless, EFT is not likely to be universally accepted until the next century, but is likely to modify the behavior of all credit card users during the next 15 years. Some researchers anticipate a \$44billion market in 1990, largely because the versa-tility and wide recognition of certain on-line credit systems will cause EFT to grow in ways that grocery shoppers and jet travelers will welcome. Public dependence on computers will become solidified only when one or two real cash registers are left in the supermarket.

The larger system in which these terminals participate is out of sight and out of mind as far as the public is concerned. Like other popular media, EFT is likely to be embraced by the public long before its full potential is recognized by most people. Still, when all is said and done, Still. we may well be living in an almost paperless, cashless society





T. Owen Hull, above, chief of data communications, Sikorsky Aircraft, remembers what be terms his 'first hig screw-up.'' I have been in the data process-

I have been in the data processing industry for 21 years, but my first big screw-up will always stay in my mind.

Twenty years ago, the large computers that we are all familiar with today did not exist. At that time, I worked in a large shop with many IBM 1401 computers that had a grand total of 8K bytes of memory. The only I/O devices were a card reader, card punch and, of course, a 600 line/min printer.

Since we had no tape or disk drives, most I/O was done with the card reader and the card punch. The Fortran compiler was about 3,000 cards punched in load-module format, with several phases, known in today's terminology as overlay structures. Compiler work files were punched on the card punch and read back in through the card reader as input.

One night on second shift, I was working alone in one of the computer rooms running compiles and testing. One of the jobs was to run Fortran compiles, and I dropped the tray of cards contain-

ing the Fortran compiler on the floor. I then had to play the game of 3,000 pickup.

I knew that they were out of sequence, and I knew that they were sequenced in columns 73 through 80. So, I ran them through the card sorter in order to make the compiler useful again. In those days, the card sorter operated at the phenomenal speed of 600 card/min, but each column had to be processed individually or eight passes of the card deck through the sorter. The sorting process took about an hour, but it seemed like five hours.

Of course, the compiler didn't work. What I had failed to recognize was that each phase was sequenced separately. In fact, I had 100 card "ones" together, 100 card "twos" together and so on. In those days, the backup for the card deck was a listing of each card, so in order to get the Fortran compiler operable again, I had to match each card with the listing. It took hours to get the compiler back together again.

Now things are much easier in the area of backup and recovery, but in the old days, dropping a box of cards could be a major catastrophe.

Computerworld Sales Offices

Donald E. Fagan, Vice-President/Sales. Edward P. Marecki, Director/National Sales. Frank Collins, Corporate Advertising Administrator, Kathy Doyle, Marketing Support Manager. Pam Valentinas, Advertising Traffic, Special Publications. COMPUTERWORLD, 375 Cochituate Road, Box 880, Framingham, Mass. 01701, Phone: (617) 879-0700, Telex: 95-1153.

BOSTON SALES OFFICE: Chris Lee, Northern Regional Director. Jim McClure, Ronald Mastro, Jayne Donovan, Michael F. Kelleher, District Managers. Alice Longley, Sales Assistant. COMPU-TERWORLD, 375 Cochituate Road, Box 880, Framingham, Mass. 01701, Phone: (617) 879-0700, Telex: 95-1153.

NEW YORK SALES OFFICE. Michael J. Masters, Eastern Regional Director. Doug Cheney, Senio District Manager. Ray Corbin, Joan Daly, Fred LoSaplo, District Managers. Gale M. Paterno, Sale Assistant. COMPUTERWORLD, Paramus Plaza I, 140 Route 17 North, Paramus, N.J. 07652, Phone (201) 967-1350.

CHRCAGO SALES OFFICE: Art Kossack, Russ Gerches District Managers. Jean F. Broderick, Sales Assistant. Chris Lee, Northern Regional Director. COMPUTERWORLD, 2600 South River Road, Suite 304, Des Plaines, Ill. 60018, Phone: (312) 827-4433.

LOS ANGELES SALES OFFICE: Bob Hubbard, Senior District Manager. Bernie Hockswender, District Manager. Beverly Raus, Account Coordinator. William J. Healey, Western Regional Director. COMFUTERWORLD, 18008 Skypark Circle, Suite 260, Irvine, Calif. 92714, Phone: (714) 261-1230.

SAN PRANCISCO SALES OFFICE: William J. Healey, Western Regional Director. Barry G. Milione, Sealor District Manager. Ernie Chamberlain, District Manager. Ruth Gordon, Account Coordinator. Nicole Boothman, Recruitment Account Manager, Debota Cramer, Account Manager, COMPUTERWORLD, 300 Broadway, Suite 20, San Francisco, Calif. 94133, Phone: (415) 421-7330.

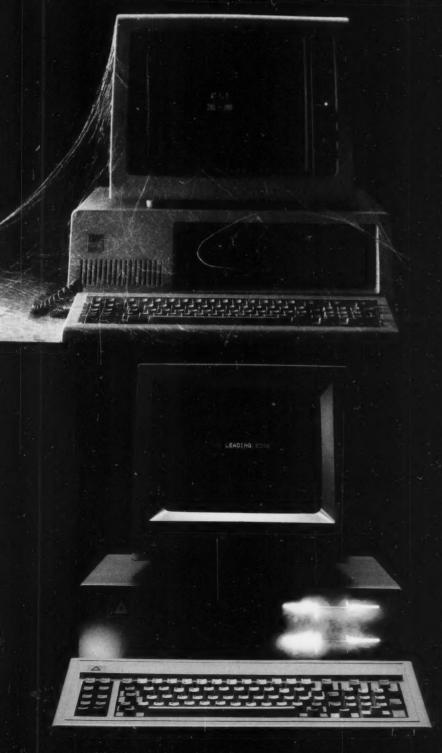
ATLANTA SALES OFFICE: Jeffrey Melnick, District Manager. Michael J. Masters, Eastern Region al Director. COMPUTERWORLD, 1853 Peeler Road, Suite D, Atlanta, GA 30338, Phone: (404) 394-0758.

ADVERTISERS INDEX

Anderson Jacobson
108-263-8520 YT & T Informations Systems
500-24/-1212, ext. 326 twant Garde
3ytex
Codex
800-821-7700, ext. 886, ext. 889 Concord Data Systems
CWCI 52-53,59,60,75
CW International 52-53,59,60,75
901-083-3043
Datastream .34 408-986-8022; Outside CA 800-952-2500 .16-7 DEC/Networking .16-7
1-800-DIGITAL DB00-832-6277 38
Digilog
Digital Communications Assoc./INA
Digital Communications Assoc./TAC32-33
Dynatech
GTE Business Communications Systems64-65
GTE Telenet
IBM56-57
1-800-IBM-2468, ext. 557 Infinet
617-681-0600 Infotron
1-800-345-4636 InteCom, Inc
1-800-INTE-800; In TX 1-214-727-9141 Intelligent Technology
Leading EdgeCover
#15-328-2411 Leading Edge
MDS
800-MDS-HERO Micom Systems
213-998-8844 Microcom
1-800-322-ERA2 Microframe
201-828-4499
National Product Marketing22-2 800-241-1170
800-241-1170 NEC Telephones
1-800-225-4698
NPI
Paradyne
Pathway Design
POPCOM
Renex8
703-451-2200 ROLM
LP.Sharp4
416-364-5361 Siemens
1-800-327-0636 Sytek Corp. 6 415-966-7333
3M
1-800-328-1684 Tymnet
408-946-4900
Ungermann-Bass
Wall Data 1-800-433-3388
Xyplex, Inc

This index is provided as an additional service. The publisher does not assume any liability for errors or omissions.

THE DAY THE IBM PC BECAME OBSOLETE.



LEADING EDGE PRODUCTS, INC. SYSTEM SALES DIVISION, 225 TURNPIKE STREET, CANTON MA 02021

A

Put more on the lines you already have

Are you installing new terminals faster than you can string new communications lines for them? Don't bother to put in more lines. Chances are that your existing wires can carry several times as much data as they do now—with a little help.

The INSTAMUX470, one of the components of MICOM's INSTANET™ "instant" local network, can give them the help they need by providing:

Local Multiplexing

of up to eight asynchronous terminals on the same double twisted-pairs of wires conventionally used to support only a single terminal or telephone.

Data Rates to 19,200 bps

Each terminal operates as if it has its own dedicated 19,200 bps line to the computer or data PABX, and all terminals can operate simultaneously—without interference.

Integral Line Driver

To eliminate the need for moderns or line drivers for each individual terminal.

No Transmission Delay

Unlike regular multiplexors, the INSTAMUX is designed specifically for in-house use. As a result, it doesn't introduce transmission delays of any kind, and the multiplexed system's response "feels" the same to the terminal operator.

And for users of MICOM's INSTANET Local Networks, there's still another advantage: INSTAMUX is available as an integral plug-in module for the Micro600 Data PABX.

What's more, INSTAMUX costs less — much less — than the line drivers you'd need if each terminal had its own set of wires.

Don't get strung out. <u>Call or send today for literature</u> describing the INSTAMUX470 and its applications.



MICOM SYSTEMS, Inc., • 20151 Nordhoff Street • Chatsworth, CA 91311 • Telephone (805) 583-6600 • TWX 910/494-4910 Regional Sales/Service • Atlanta, GA • (404) 435-2999 • Boston, MA • (617) 527-4010 • Chicago, IL • (312) 783-2430 Dallas, TX • (214) 258-0774 • St. Louis, MO • (314) 576-7626 • Teaneck, NJ • (201) 836-4000 MICOM-BORER Ltd. • Bel Court • 15 Cradock Road • Reading, Berkshire RG20JT, England • (0734) 866801 • Telex 847135

AVAILABLE NOW FROM THESE STOCKING REPS. . AK: Anchorage (907) 561-1776 / Juneau (907) 789-4101 • AL: (800) 327-6500 • AR: (214) 620-1551 • AZ: (602) 994-5400 CA: Anaheim (714) 635-7600 | Lodi (209) 334-1961 | San Diego (619) 565-1557 | San Jose (408) 298-7290 • CO: Colorado Springs (303) 594-0880 / Denver (303) 777-8070 CT (617) 235-5520 • DE: (609) 779-0200 • FL: (800) 432-4480 • GA: (800) 327-6500 • HI: (808) 537-9758 • JA: (402) 895-5850 • DE: (801) 466-6522 • IL: (312) 255-4820 IN: (317) 846-2591 • KS: (816) 252-3700 • KY: (802) 228-5401 • LA: (800) 327-6500 • MI: (617) 235-5520 • MI: (617) 235-5520 • MI: (313) 588-2300 MM: (612) 425-4455 • MO: Independence (816) 252-3700 / St. Louis (314) 721-0401 • MS: (800) 327-6600 • MT: (801) 466-6522 • NC: (801) 327-6600 • ND: (612) 425-4455 • NE: (402) 895-5850 • MI: (617) 235-5520 • MI: (617)

